High Resolution Geophysical and Geotechnical Survey Plan

Empire Wind

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ACRONYMS AND ABBREVIATIONS

BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
CPT	Cone Penetration Test
dB	decibels
DMA	Dynamic Management Area
ESA	Endangered Species Act
FCP	Fisheries Communications Plan
FIR	Fisheries Industry Representative
FLiDAR	Floating Light and Detection Ranging
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
ft	feet
GPS	Global Positioning System
HRG	high resolution geophysical
IHA	Incidental Harassment Authorization
kHz	kilohertz
km	kilometers
Lease Area	Offshore Area Included in the BOEM Lease Application
m	meters
MBES	Multibeam echosounder
mi	miles
NMFS	NOAA National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NVD	Night Vision Device
NY EA	BOEM's 2016 *Environmental Assessment of Commercial Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York*
OCS	Outer Continental Shelf
PAM	Passive Acoustic Monitoring
PSO	Protected Species Observer
QMA	Qualified Marine Archaeologist
SAP	Site Assessment Plan
SBP	Subbottom profiler
SMA	Seasonal Management Area
SSS	Sidescan sonar
Statoil	Statoil Wind US LLC
Tetra Tech	Tetra Tech, Inc.
the Project	New York Offshore Wind Farm (Empire Wind)
USBL	ultrashort baseline
USGS	U.S. Geological Survey

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1.0 INTRODUCTION

Statoil Wind US LLC (Statoil) is submitting this revised Survey Plan to advance the development of Empire Wind (the Project), under the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf (OCS-A 0512) (Lease). Comments on the draft Survey Plan that was submitted on November 17, 2017 were received from BOEM on December 11 and 12, 2017 and were addressed in an updated version of the Survey Plan delivered to BOEM on December 19, 2017. A pre-survey meeting was held in accordance with Addendum C, Lease Stipulation 2.1.2 on December 20, 2017. Additional comments were provided on February 1, 2018. Comments received during the pre-survey meeting as well as those provided on February 1, 2018 are addressed in this version of the survey plan.

Statoil will conduct a High Resolution Geophysical (HRG) survey of the entire Lease Area[1] and one or more export cable route corridors to inform both overall Project design and engineering as well as site selection for deployment of buoys within the Lease Area. Data acquired through this field program will be provided in the Site Assessment Plan and Construction and Operation Plan for the Project. The cable route corridors will be located between the Lease Area and New York shoreline in the area identified as the Cable Route Area in Figure 1. The cable route corridors are anticipated to be 180 meters (m, 590 feet [ft]) wide. For the purpose of this plan the Survey Area is defined as the Lease Area and cable route corridors to be investigated.

Statoil intends to deploy up to two meteorological data collection buoys, referred to as floating light and detection ranging buoys (FLIDARs), and up to two metocean/current buoys (met buoys) in the Lease Area to support site assessment activities. One set of the FLiDAR and met buoys will be repositioned within the Lease Area after 12 months. Therefore, Statoil will select three data buoy deployment areas to be described in the Site Assessment Plan (SAP)

As required by Addendum C, Lease Stipulation 2.1.1, Statoil must submit a Survey Plan to the Bureau of Ocean Energy Management (BOEM) prior to conducting surveys, for agency review and comment in support of the SAP and Construction and Operations Plan (COP). This Survey Plan describes the survey activities needed to meet the relevant information requirements of 30 Code of Federal Regulations (CFR) § 585.610(b). Section 2 of this plan describes the existing conditions in the Lease Area and Cable Route Area; Section 3 describes the surveys proposed; Section 4 presents the Marine Mammal Mitigation Plan; Section 5 presents the Fisheries Communication Plan; Section 6 summarizes Statoil's compliance with the relevant requirements in the Lease, BOEM guidelines and BOEM regulations; and Section 7 presents a schedule of activities as directed by the Lease.

In addition, to support survey operations, Statoil has requested an Incidental Harassment Authorization (IHA) from National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). A copy of the IHA, once received, will be provided to BOEM.

1.1 Survey Team

1.1.1 Survey Contractor

Statoil has selected Alpine Ocean Seismic Survey, Inc. (Alpine) to perform the works as outlined in this Survey Plan. Based in Norwood, New Jersey, Alpine, a Gardline group company, has successfully completed projects in 40 states and 40 countries over 6 continents. Since its inception in 1957, Alpine has conducted more than

[1] The Lease Area is defined by *Addendum A of BOEM Lease No. OCS-A 0512, Section II. Description of the Lease Area*. The total acreage of the Lease Area is approximately 79,350 acres. The Lease Area is depicted in its entirety on Figure 1-1 of this Survey Plan.

3,000 marine survey projects of a similar multidisciplinary nature as envisaged as part of the scope of work discussed in this Survey Plan.

As part of the Gardline group of companies, Alpine is able to draw on the resources of the Gardline group to conduct survey activities as required in order to meet the specific objectives of the Project. Gardline, based in Great Yarmouth, United Kingdom (UK) and itself established in 1969, has conducted over 10,000 geophysical, geotechnical and environmental projects over its 47-year history. The majority of these projects have been multidisciplinary in nature and as such Gardline is in a good position to assist Alpine in completing the activities described in this Survey Plan. Gardline has offices established in UK, Brazil, Singapore, Nigeria, and Perth (Australia). Gardline has conducted recent projects within U.S. waters and understands the needs and requirements of conducting survey and vessel operations within the region.

For the purposes of this Project, Alpine shall act as lead contractor to the Project and Gardline shall support Alpine through the acquisition of survey vessel RV Ocean Researcher and associated personnel and equipment in order to fulfil the survey objectives as laid out in the technical specifications.

1.1.2 Qualified Marine Archaeologist

SEARCH, as a subcontractor to Statoil's environmental consultant, Tetra Tech, Inc. (Tetra Tech), will serve as the Qualified Marine Archaeologist (QMA) during execution of the Survey Plan, as provided in BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (BOEM 2017) (summarized in Section 2.2). SEARCH is a leading nationwide and global provider of cultural resource services and has conducted over 3,000 projects across 38 U.S. states, all six U.S. territories, and 24 countries in Oceania, Asia, Africa, Europe, the Americas, and the West Indies. SEARCH has the largest team of professional archeologists in the United States, with the highest-capacity marine archaeology division.

Per Lease Stipulations 2.1.2 and 4.3.3, the QMA will participate in a pre-survey meeting with the Shinnecock Indian Nation. At this meeting, Statoil, SEARCH, the Survey Contractor, and the Shinnecock Indian Nation will discuss the survey plan and submerged archaeological resources that may require evaluation during the survey.

1.1.3 Environmental Consultant

Tetra Tech is a leading provider of consulting, engineering, program management, construction, and technical services addressing the resource management and infrastructure markets. Tetra Tech is supporting Statoil with this survey plan to ensure full compliance with applicable Lease conditions and reporting requirements. Tetra Tech will conduct the environmental awareness training for the Survey Contractor. Additionally, Tetra Tech's benthic habitat assessment team will be reviewing results of the high resolution geophysical (HRG) survey and evaluating the existing habitat at proposed buoy deployment areas and geotechnical sampling locations. Tetra Tech will work with Statoil to ensure that no sensitive benthic habitat is disturbed during execution of the proposed survey plan or the upcoming buoy deployment activities.

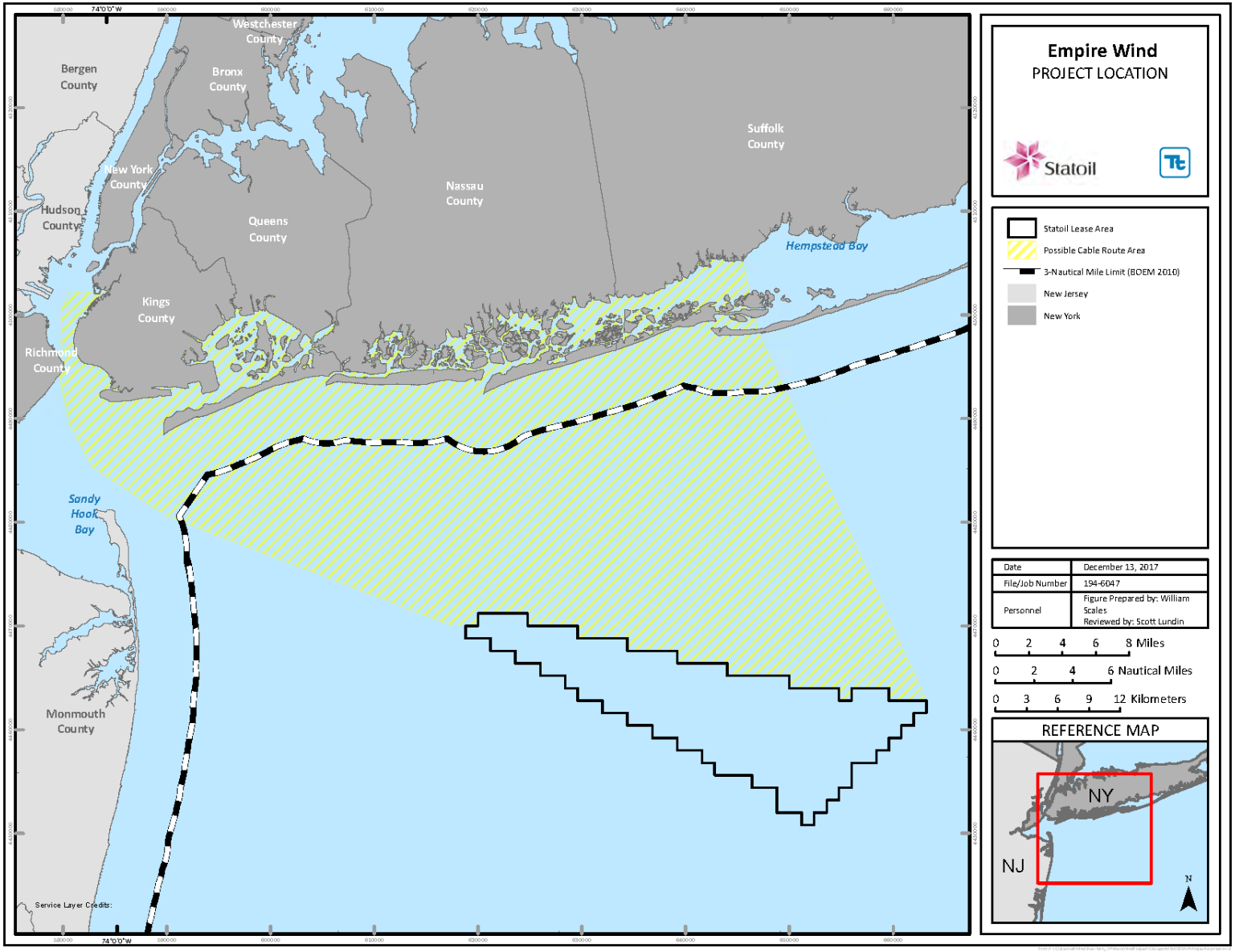

Figure 1-1 Statoil Wind US LLC Empire Wind Lease Area

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2.0 EXISTING CONDITIONS

Lease Area OCS-A 0512 is approximately 13.7 miles (mi) (22 kilometers [km]) south of Long Island, New York and spans 79,350 acres. Water depths across the Lease Area range from approximately 72 to 135 ft (22 to 41 m). The cable route corridor(s) will extend from the Lease Area to shore.

The following section presents an overview of the existing conditions relevant to the proposed survey activity, which is understood to characterize the Lease Area and Cable Route Area. These conditions form a baseline upon which the site characterization survey program was designed.

2.1 Geological and Shallow Hazard

The New York Lease OCS-A 0512 lies on the western half of the Atlantic Outer Continental Shelf (OCS), which is the submerged extension of the Coastal Plain Province. The continental shelf has a gentle, regional slope of about 0.001 degree and extends from the New York/New Jersey coastline eastward for about 87 mi (140 km). Predominant features on the continental shelf include paleo shorelines, shoals, filled channels and valleys, and shoal retreat massifs. The sediment provinces surrounding the Lease Area include: 1) shelf ridges, 2) the Hudson Shelf Valley, and 3) Hudson Sediment Lobes and the area lies on top of the Mesozoic New York Bight Basin (Schwab et al. 2002; Knebel et al. 1979).

According to the United States Geological Survey (USGS), usSEABED database, the Lease Area is dominated by fine and medium grained sand, with lesser amounts of gravel. An area located near the central region along the southwest perimeter of the Lease Area is reported to have gravel present. The surficial sandy deposits are anticipated to be approximately 3 to 16 ft (1 to 5 m) thick and are anticipated to be underlain by Transgressive deposits. The Transgressive deposits may be fine-grained or interbedded fine and coarse-grained deposits that are 3 to 33 ft (1 to 10 m) thick where they comprise channel infill deposits. Pleistocene deposits inferred to be related to glacial outwash and alluvium are anticipated to underlie the Transgressive and marine deposits. Coastal Plain deposits inferred to be Pre-Quaternary or Cretaceous in age underlie the Pleistocene deposits and may be exposed or within 3 to 10 ft (1 to 3 m) of the seafloor at the western margin of the Lease Area (Sullivan et al. 2016; BOEM 2017).

Significant physiographic features on the shelf in this region are the result of a northeast-southwest-trending rift basin structure that formed as a result of extensional tectonics during the Jurassic and Triassic periods (Grow et al. 1988). The degree of induration of the sediments generally increases with depth. Within the vicinity of the Lease Area, there occur a variety of bedforms of differing sizes, ranging from micro features like ripples which are centimeters in scale, to macro features like sand waves and ridges which are meter to kilometer in scale, respectively.

2.2 Marine Archaeological Resources

BOEM requires the Leaseholder to verify that bottom disturbing activities, including the deployment of the FLIDAR and met buoys, avoid impacts to submerged archaeological resources. Potential prehistoric archaeological resources would include archaeological sites from the area's earliest inhabitants located on flooded prehistoric landforms (paleo-landscape features). Corresponding with lower global sea level during the Late Pleistocene, the section of the OCS where the Lease Area is located was once exposed, dry land and was submerged by rising sea level during the Early Holocene. These previously exposed areas are identified as having a high potential for the presence of submerged archaeological sites (TRC 2012) dating to the time periods during which they were exposed. Landforms where submerged sites are expected to occur include paleochannels (i.e. Hudson Valley Shelf), embayments, river terraces, and outcrops of lithic resources. A

number of sites have been identified in the Mid-Atlantic Bight between Cape Cod and the Chesapeake Bay within the last twenty years (Straight (1990). Some have been the result of accidental finds by fishermen while others have been identified during dredging or other offshore construction activities. One such accidental discovery is the Corcione artifact collection. This collection of more than two hundred stone artifacts, dating from the late to early archaic, was found along the New Jersey shoreline after beach renourishment activities in 1994 (Merwin 2003). The source of the sand from which these artifacts originated was a borrow area located approximately 3 km east of Sandy Hook in about 14 m of water. In light of these finds there is potential for pre-contact archaeological sites associated with the Paleo-Indian (ca. 11,000 – 9,000 BP), Archaic (ca. 10,000 – 3,000 BP), and Woodland (3000 – 400 BP) periods to be buried within the seabed sediments (TRC 2012). Shoreline transgression has the potential to preserve pre-contact archaeological sites, which have been submerged and buried beneath marine sediments. Historic Period (16th – 20th C) resources discovered within the Lease Area would be representative of historic maritime activities (i.e., shipping and transport, fishing, exploration, and colonial settlement). These resources would likely include wrecks of sail and steam-powered craft that frequented the waters offshore New York and New Jersey during the nearly four centuries of Euro-American occupation (TRC 2012). New York Harbor has been an important commercial entrepôt since the early seventeenth century when the Dutch colonized Manhattan Island in 1624. A study conducted by TRC (2012) concluded that the offshore waters leading into New York Harbor have a high potential for shipwreck resources. At least 2,030 wrecks have been documented by BOEM along the coastal waters leading into New York (TRC 2012). Lying only 12 miles from the entrance to the harbor the potential for the lease area to contain undiscovered shipwreck resources should be considered as high.

The QMA will prepare an archaeological resource assessment report for the SAP and the COP in accordance with BOEM guidelines (2017). Each report will be focused on the Area of Potential Effect associated with the respective Plan. Archival research in support of the report will be conducted to establish a baseline database of identified and potential submerged cultural resources that have the potential to be affected by the buoy deployment activities. This research will include a review of shipwreck databases, including NOAA's (2016) Wrecks and Obstruction Database that sources information from the Electronic Navigational Chart layers and the Automated Wreck and Obstruction Information System; the Northern Maritime Research database (NMR 2002); the BOEM Mid-Atlantic OCS shipwreck database (2013); the TRC Environmental Corporation archaeological site inventory (2012), and relevant secondary sources (e.g., Berman 1972; Gentile 2002). Preliminary examination of the above databases has revealed at least eight named and five unnamed shipwrecks within the lease area. Historic navigation charts, available online from the Office of Coast Survey's Historical Map & Chart Collection (2016), will also be reviewed to identify charted shipwrecks and to maximize existing information on the probability of cultural resource occurrence. This archival research effort will be supported by the site-specific survey data analysis.

2.3 Benthic Resources

The Lease Area and Cable Route Area is predominantly characterized as sand with isolated patches of gravel-sand. Although generally flat lying, the Lease Area and Cable Route Area contains sand ridges, filled valleys, shoal-retreat massifs, and paleoshorelines. In general, benthic habitat throughout the area is expected to be relatively homogeneous. The Nature Conservancy analyzed ten years (2003–2012) of data from the University of Massachusetts School for Marine Science and Technology scallop video survey and identified the dominance of species associated with sandy unconsolidated bottom habitat in the vicinity of the Lease Area as primarily sand dollars, sea scallops, and sea stars (BOEM 2016).

3.0 SURVEYS

Statoil plans to conduct a HRG survey and shallow geotechnical survey that will support the evaluation of:

- Shallow hazards and geological conditions; and
- Marine archaeological resources

Development of the shallow hazard and geologic condition survey plan has been closely coordinated with the marine archaeological team to ensure acquired data also meets the requirements for those investigations. Impacts on all other resources as defined in 30 CFR § 585.611(b) associated with the deployment, operation, and decommissioning of the buoys will be consistent with the findings of the *Environmental Assessment of Commercial Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York* (NY EA) (BOEM 2016). In addition, Statoil will comply with the mitigation measures already identified within both the NY EA and the Lease.

This Survey Plan includes a discussion of only the HRG surveys and shallow geotechnical surveys that will be completed prior to development of the SAP and the COP. Statoil will submit a separate survey plan to support the evaluation of the benthic resources potentially impacted by the Project. Additional survey plans will be prepared to support future resource characterization activities.

3.1 Basis of Survey Specifications

Statoil has developed detailed survey specifications based on the following:

- Requirements set forth in the Lease (Lease Stipulations 4.3 & 4.4);
- BOEM's *Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585* (BOEM 2015);
- BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585 (*BOEM 2017);
- BOEM's *Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (BOEM 2013); and
- *BOEM Guidelines for Submission of Spatial Data for Atlantic Offshore Renewable Energy Development Site Characterization* (BOEM 2013);
- Existing information on the surficial and subsurface geologic features, geologic processes, geohazards and submerged archaeological resources within the Lease Area and surrounding waters; and
- Statoil's standard operational procedures.

3.2 HRG Survey

Surveys will be conducted with gridded survey lines at a spacing of approximately 98 ft. by 1,640 ft. (30 m by 500 m). The following HRG survey and sampling activities will be conducted:

- Depth sounding (multibeam echosounder) to determine site bathymetry and elevations;
- Magnetic intensity measurements (gradiometer) for detecting local variations in the regional magnetic field from geological strata and potential ferrous objects on and below the bottom;
- Seafloor imaging (sidescan sonar survey) for seabed sediment classification purposes, to identify natural and man-made acoustic targets on the seabed, as well as any anomalous features;
- Shallow penetration sub-bottom profiler to map the near surface stratigraphy (top 0 m to 5 m) soils below seabed);
- Medium penetration sub-bottom profiler to map deeper subsurface stratigraphy as needed (soils down to 75-100 m below seabed); and

- Sediment grab samples to support interpretation of geophysical data to characterize surficial sediment conditions and benthic habitat. A more robust benthic assessment of the Lease Area will be proposed either as part of the 2019 geotechnical survey program, or as an individual survey effort some time in the future to inform the COP.

Based upon careful consideration for the project objectives and technical specifications in combination with the schedule, geographic location, HSE risk and political environment, a multi-vessel campaign is proposed. Two of the survey contractor's vessels will be deployed. The RV Shearwater will survey the submarine cable routes, as well as conduct the benthic grab samples to be collected at the FLiDAR locations. The RV Ocean Researcher will conduct survey across the Lease Area as well as the centerline of the export cable corridor.

3.2.1 RV Shearwater

The RV Shearwater is a proven multi-role survey vessel with the flexibility to provide efficient and effective configurations for the completion of her project into 5m mean lower low water (MLLW) limit. Survey operations shall be conducted on a 24hr basis and will cover the 180 meter wide cable route corridor using the MAR survey package. Benthic sampling operations will be conducted on completion of geophysics without the need for vessel reconfiguration as the vessel shall be fully mobilized for all scopes of work during the project mobilization phase. The Shearwater will be configured to deploy, tow and use all survey gear simultaneously. This includes the Multibeam echosounder (MBES), which will be hull mounted, the sidescan sonar (SSS) and Gradiometer systems which will be towed off independent winches, and the Chirp subbottom profiler (SBP) and ultrashort baseline (USBL) systems which will be deployed via a central moon pool.

A summary of equipment (or similar) that will be deployed from the RV Shearwater is provided below:

Table 3-1 Proposed HRG survey equipment for the RV Shearwater (or similar)

System	Type
Horizontal Control, Motion and Heading	System 1: Applanix POS MV GPS Aided Motion Compensation System with C-Nav 3050 DGPS with C-Nav^2 Satellite Corrector System 2: Applanix POS MV GPS Aided Motion Compensation System with Hemisphere S321 DGPS with Atlas Satellite Corrector
Integrated Navigation System	QPS QINSy
USBL, Primary Layback Positioning	Sonardyne Scout Pro USBL
Cable Counter, Secondary Layback Positioning	Cable Counter For Winch #1 and a Cable Counter for Winch #2
MBES	R2Sonic 2024 Broadband Multibeam Echosounder
SBES	Odom Echotrac CVM Dual Frequency Single Beam Echosounder
Side Scan Sonar	Edgetech 4200; 300/600Hz
Gradiometer	Paired Geometrics G882 Magnetometers
Shallow Subbottom Profiling	Teledyne Benthos Datasonics Chirp III
Sound Velocity Profilers	Teledyne Oceanscience UnderwaySV system (or similar) plus backup SVP Applied Microsystems Sound Velocity Profiler or equivalent
Environmental Sampling	Alpine 0.1m^2 Day Grab Gardline High Definition Seabed Camera System
PSO Equipment	Binoculars Passive Acoustic Monitoring System Gen3 Night Vision Goggles with clip-on thermal imagers

3.2.2 RV Ocean Researcher

RV Ocean Researcher is a proven seismic survey platform, acoustically quiet, large and comfortable enough to accommodate the required survey sensor spread and team. The vessel is able to operate in water depths deeper than 15m. Survey operations shall be conducted on a 24hr basis. All required geophysical survey equipment shall be run in one pass. The Ocean Researcher will also be configured to deploy, tow and use all survey gear simultaneously. This includes the dual head Kongsberg EM2040C MBES, which is hull mounted, the SSS and Gradiometer systems which will be towed off independent winches, and the Pinger shallow penetration SBP. A Multi-Channel ultra-high resolution seismic (UHRS) source and streamer system will be mobilized, configured and utilized.

A summary of the equipment (or similar) that will be deployed from the RV Ocean Researcher is provided below:

Table 3-2 Proposed HRG survey equipment for the RV Ocean Researcher (or similar)

System	Type
Horizontal Control	Fugro Starfix HO or C-Nav DGPS, VGPS DGPS QC system
Vertical control	Post Processed Kinematic (PPP) techniques
Integrated Navigation System	Voyager 5 (Gardline in-house software)
Heading Reference	TSS Meridian Surveyor Gyro Compass
SBES	Simrad EA 400 c/w Wavemaster POS MV MRU (motion compensation)
MBES	Kongsberg Simrad EM2040D dual head 2- 400kHz 1x1 dual head and velocity probes (hull mounted) c/w Applanix POS MV MRU (motion compensation) Caris HIPS/SIPS processing
USBL	Sonardyne Ranger 2 USBL (pole mounted, deployed via gate valve) and Applied Acoustic 1019D Wide band beacons
Side Scan Sonar	Edgetech FS4200; 300/600kHz Fitted with mini SVS for underway dips
Gradiometer	2 x Geometrics G882 with Geometrics gradiometer frame
Shallow Sub-bottom profiling equipment and processing	Massa 16 element hull-mounted transducer array, Tx & Rx configurable as required by patch panel. Digital recordings to OMS 760.
Multi Channel Medium Sub-bottom profiling	Multi Channel Streamer - Teledyne 48channel, 3.125 group length streamer. 4 hydrophones per group, 150m total active length. Source - Geomarine Geo-source 200-400 catermaran sparker, Geode recorder system, 3.125 SPI, 0.25ms sample rate, split fold data. **or** Multi Channel Streamer - Gardline µSeis 96channel,1.0m group length streamer. 96m total active length. Source - Geomarine Geo-source 200-400 catermaran sparker, Gardline µSeis Recorder system, 0.5m, 0.0625ms sample rate, full fold data
Sound Velocity Profilers	Valeport 650 MkII SVP profilers
PSO Equipment	Passive acoustic monitoring systems Infra red and night vision goggles Acoustic Recording Units plus seabed frames with acoustic release, USBL beacons, ground tackle and surface marker buoys
Optional: Geotechnical Equipment	Neptune 5000 3m Vibracorer

The multichannel array subbottom system will be operated on 492-ft (150-m) spaced primary lines, while the single channel array subbottom system will be operated on 30-m line spacing to meet BOEM requirements as set out in the March 2017 *Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant and Archeological and Historic Property Information to 30 CFR Part 585*. Available information on the New York Bight reveal that submerged landscape surfaces will be either still exposed or found buried approximately 1.5 to 2m below the bottom surface and therefore marine cultural resource assessment may not need to focus below that. The shallow penetration subbottom profiler is anticipated to obtain this level of penetration at 30m line spacing. However if the survey contractor finds that acoustic penetration is less than that, due to site conditions, and the medium penetration profiler achieves deeper imagery then the medium penetration profiler will be operated

at 30m line spacing in areas where necessary to achieve sufficient data resolution to adequately evaluate archaeological potential for bottom disturbing activities above the Holocene-Pleistocene unconformity.

The survey equipment will be configured aboard the survey vessel to optimize data quality, reduce ambient noise and cross talk. Vessel speed will be maintained as high as possible without affecting the quality of the survey data, typically at 3 to 6 knots. Speed is often reduced during rougher weather to allow survey operations to continue as sea conditions also affect the data quality. The survey equipment will be operated in accordance with manufacturer's recommendations. Industry standard protocols for data transformation and transfer and cultural resource needs will be followed to ensure the integrity of the original data set and the quality of post-processed data. Calibration will be performed daily, or as needed, to ensure proper equipment functionality and data quality.

It is anticipated that the HRG survey will take approximately 4.5 months. This survey schedule is based on 24-hour survey operations and includes estimated HRG survey equipment field verification, system patch test/calibrations, and weather and survey down time.

Table 6-2 describes how Statoil will comply with the requirements in the Lease while survey activities are conducted.

3.3 Geotechnical Survey

Statoil plans to conduct geotechnical surveys throughout the Survey Area that will include:

- Vibracores to a target depth of 3 m (10 ft) to determine the geological and geotechnical characteristics of the sediments along the Cable Route Corridors below the target penetration depth of the cable, which is currently anticipated to be 2m (6 ft); and
- Seabed Cone Penetration Testing (Seabed CPT) will be performed to a maximum penetration of 20 m or until the unit reaches refusal to determine stratigraphy and in-situ conditions of the sediments.

The geotechnical survey will be conducted from the RV Ocean Researcher at the completion of the HRG survey such that remote sensing data can be utilized to plan sampling locations. Seabed CPT will be conducted at 10-15 locations across the Lease Area to provide a preliminary characterization of the Lease Area. To the extent that cable route corridors have not yet been defined, the total number of samples is unknown at this time. It is anticipated that vibracore samples and CPT will alternated along the selected cable route corridors every km, such that intervals for each vibracore and CPT location will be approximately 2 km. The investigation activities may be conducted from a dynamically positioned sampling vessel.

All geotechnical information will be acquired in conformance with BOEM's *Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant and Archeological and Historic Property Information to 30 CFR Part 585* (BOEM 2017).

A second geotechnical campaign, which will be covered in a separate survey plan submission, is scheduled to occur in 2019, which will involve deep borings and CPT to inform foundation design. The currently proposed geotechnical activity is intended to support cable routing.

3.3.1 Pre-Clearance of Sampling Locations

Prior to conducting the geotechnical survey, Per the Addendum C, Lease Stipulation 4.3.4, the area of potential impact (inclusive of any area associated with vessel jacking or anchoring) would be reviewed by a benthic resource specialist and the QMA to ensure activities would not result in impacts to important benthic habitat

and/or areas of cultural significance. In accordance with Lease Stipulation 4.3.4.3, upon completion of the geotechnical sampling program, the QMA will certify that activities did not impact potential historic properties as a result of the HRG survey. Certifications will be documented in the archaeological reports submitted with the SAP and COP.

3.4 Reporting

Per Lease Stipulation 4.4.1, a Site Characterization Report will be developed that presents the potential natural and man-made shallow hazards that are identified in the Survey Area. The report would be developed based on BOEM's guidelines (*Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585* and, to the extent appropriate, the *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*).

Statoil intends to use the data collected during the surveys to support development of its SAP and COP. Only data specific to the buoy deployment areas will be assessed in the SAP. All data collected during the surveys will be used to inform the COP.

3.4.1 QMA Reporting

Per Lease Stipulation 4.3.2, at the conclusion of the survey activities, an Archaeological Resource Assessment Report will be developed by the QMA. The Assessment Report will be developed in accordance with BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585* (2017). Data will be processed and interpreted by the survey contractor and delivered to the QMA in accordance with the data transfer protocols described in Appendix A. The level of analysis and reporting will be sufficient to support BOEM with the final consultation requirements under Section 106 of the National Historic Preservation Act. Additionally, per Lease Stipulation 4.3.3, the QMA will be available to attend the pre-survey meeting with BOEM and the Shinnecock Indian Nation to discuss the survey plan and any issues related to submerged archaeological resources that may require evaluation during the survey and/or development of the SAP and COP.

3.4.2 Benthic Resource Reporting

At the conclusion of the HRG survey, the Environmental Consultant will review relevant HRG data, the sediment grab and video imagery to evaluate the existing benthic habitat in the buoy deployment area. A report will be prepared to present the findings of the data review and document the absence of any sensitive biological habitat in the buoy deployment area. Presence or absence of high density scallop beds will be evaluated using the benthic imagery at the buoy deployment areas. The benthic habitat assessment report will be provided to BOEM in the SAP prior to initiating deployment of the buoys.

4.0 MARINE MAMMAL MITIGATION PLAN

4.1 Field Verification

Lease Stipulation 4.4.6.2 requires that Statoil conduct a field verification of the exclusion zone for all HRG survey equipment operating below 200 kilohertz (kHz) and report the results to BOEM and NMFS. The Lease requires that field verification be performed at the onset of the survey. The results of the field verification will validate the distance to the exclusion zone, or provide justification for modification of the exclusion zone distance. Statoil hereby requests authorization to complete the field verification and provide results to both BOEM and NMFS 24-hours prior to initiating the HRG survey activities. The default 200m exclusion zone will be implemented unless field verification results indicate the Level A zone is larger than 200m or BOEM

and NMFS approve a modification to the exclusion zone in accordance with Addendum C, Lease Stipulation 4.4.6.3.

To ensure that the sound source verification requirements of Addendum C, Lease Stipulation 4.4.6.2 are met, Statoil has included the proposed HRG Survey Equipment Field Verification Plan as Appendix B. In addition to the acoustic threshold level distances to be determined according to Appendix B, Statoil will require the survey contractor to determine the distance to isopleths corresponding to Level A harassment threshold as defined in the new technical guidance from NOAA in 2016.

4.2 Alternative Monitoring Plan

Statoil proposes to conduct surveys 24-hours per day over the proposed survey period. As authorized in Lease Stipulation 4.4.3, Statoil proposes to implement an Alternative Monitoring Plan. The plan is designed to facilitate night-time operations and/or to support operations during periods when visual observations may be impaired (e.g., during bad weather, rough sea conditions, poor lighting conditions). This Alternative Monitoring Plan is specifically required to ensure the protection of marine mammals and sea turtles during survey activities under these conditions. The plan described below has been incorporated into the IHA currently under review by NMFS for the proposed survey activity.

Data indicate that visual monitoring in conjunction with passive acoustic monitoring (PAM) as combined methods provide for optimal acquisition of marine mammal species detections (Rankin et al. 2008). While visual detections are critical as a monitoring tool because marine mammals do not always vocalize, PAM has particular value for detecting cetaceans (whales, dolphins, porpoises) when sighting conditions are poor (e.g., fog, sea states, etc.). In addition, PAM can be effective for some "cryptic" species (that is, those that are hard to sight at the surface) and deep divers that are not at the surface for much time (hence, hard to sight). The mitigation procedures outlined in this section are based on protocols and procedures that have been successfully implemented for similar offshore projects and previously approved by NMFS.

This plan implements the use of PAM, night vision devices (NVDs), and infrared (IR) technologies to ensure the protection of marine mammals and sea turtles. Position data will be recorded using hand-held or vessel global positioning system (GPS) units for each sighting.

For the survey taking place on the Shearwater; 4 PSO/PAMS will be rotated as follows:

	Local time	1	2	3	4
NIGHT	00:00		PAMS		Visual
	01:00		PAMS		Visual
	02:00	Visual		PAMS	
	03:00	Visual		PAMS	
	04:00		PAMS	VISUAL	Visual
	05:00		PAMS		Visual
	06:00		PAMS		Visual
DAY	07:00			Visual	
	08:00			Visual	
	09:00		Visual		
	10:00			Visual	
	11:00		Visual		
	12:00		Visual		
	13:00		Visual		
	14:00	Visual			
	15:00	Visual			
	16:00	Visual			
	17:00				Visual
	18:00				Visual
NIGHT	19:00	PAMS			Visual
	20:00	PAMS		Visual	
	21:00	PAMS		Visual	
	22:00	PAMS		Visual	
	23:00		PAMS		Visual

For the survey taking place on the Ocean Researcher, 6 PSO/PAMS will be used. The proposed watch schedule is provided below:

	Local time	1	2	3	4	5	6
Night	00:00		PAM	IR	NVB		
	01:00	PAM					
	02:00						
	03:00					IR	NVB
	04:00						
	05:00				IR	NVB	PAM
	06:00						
Day	07:00	PSO		PSO			
	08:00						
	09:00		PSO				
	10:00						
	11:00			PSO			
	12:00						
	13:00	PSO					
	14:00						
	15:00		PSO				
	16:00						
	17:00				PSO		PSO
	18:00						
Night	19:00				NVB	IR	PAM
	20:00						
	21:00		PAM			NVB	IR
	22:00						
	23:00			IR	NVB		

PSO=visual monitoring using naked eye/binoculars; NVB = night vision binoculars; IR = infra-red device; PAM = Passive Acoustic Monitoring. Dual role training and experience prevents the necessity to have PAM operators on standby during daylight hours should weather conditions or visibility deteriorate.

4.2.1 Vessel Strike Avoidance Procedures

Statoil will ensure that vessel operators and crew maintain a vigilant watch for cetaceans, pinnipeds, (and sea turtles) and slow down or stop their vessels to avoid striking these protected species. Survey vessel crew members responsible for navigation duties will receive site-specific training on marine mammal sighting/reporting and vessel strike avoidance measures. Vessel strike avoidance measures will include, but are not limited to, the following, except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk:

- All vessel operators and crew will maintain vigilant watch for cetaceans, pinnipeds, and sea turtles and slow down or stop their vessel to avoid striking these protected species.

- All vessel operators will comply with 10 knot (<18.5 km/hr) or less speed restrictions in any Seasonal Management Area (SMA) per NMFS guidance. This applies to all vessels operating from November 1 through April 30.
- All vessel operators will comply with 10 knot (<18.5 km/hr) or less speed restrictions in active Dynamic Management Area (DMA)
- All vessel operators will reduce vessel speed to 10 knots or less when any large whale, any mother/calf pairs, whale or dolphin pods, or larger assemblages of non-delphinoid cetaceans are observed near (within 328 ft [100 m]) an underway vessel.
- All survey vessels will maintain a separation distance of 1,640 ft (500 m) or greater from any sighted North Atlantic right whale.
- If underway, vessels must steer a course away from any sited North Atlantic right whale at 10 knots (<18.5 km/hr) or less until the 1,640 ft (500 m minimum separation distance has been established. If a North Atlantic right whale is sited in a vessel's path, or within 328 ft (100 m) to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. Engines will not be engaged until the North Atlantic right whale has moved outside of the vessel's path and beyond 328 ft (100 m). If stationary, the vessel must not engage engines until the North Atlantic right whale has moved beyond 328 ft (100 m).
- All vessels will maintain a separation distance of 328 ft (100 m) or greater from any sighted non-delphinoid cetacean. If sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean has moved outside of the vessel's path and beyond 328 ft (100 m). If a survey vessel is stationary, the vessel will not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 328 ft (100 m).
- All vessels will maintain a separation distance of 50 m or greater from any sighted delphinoid cetacean. Any vessel underway remain parallel to a sighted delphinoid cetacean's course whenever possible, and avoid excessive speed or abrupt changes in direction. Any vessel underway reduces vessel speed to 10 knots or less when pods (including mother/calf pairs) or large assemblages of delphinoid cetaceans are observed. Vessels may not adjust course and speed until the delphinoid cetaceans have moved beyond 164 ft (50 m) and/or the abeam of the underway vessel.
- All vessels underway will not divert or alter course in order to approach any whale, delphinoid cetacean, or pinniped. Any vessel underway will avoid excessive speed or abrupt changes in direction to avoid injury to the sighted cetacean or pinniped.
- All vessels will maintain a separation distance of 164 ft (50 m) or greater from any sighted pinniped.
- All vessels will maintain a separation distance of 164 ft (50 m) or greater from any sighted sea turtle.

The training program will be provided to NMFS for review and approval prior to the start of surveys. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey event.

4.2.2 Seasonal Operating Requirements

Between watch shifts members of the monitoring team will consult NMFS North Atlantic right whale reporting systems for the presence of North Atlantic right whales throughout survey operations. However, the proposed survey activities will occur outside of the SMA located off the coasts of New Jersey and New York.

Throughout all survey operations, Statoil will monitor NMFS North Atlantic right whale reporting systems.

4.2.3 Monitoring and Exclusion Zone Implementation

For HRG survey and geotechnical sampling activities, an exclusion zone will be established and continuously monitored to minimize impacts to marine mammals. The Lease establishes a default exclusion zone of 656 ft (200 m), however BOEM has indicated that discussions with NMFS have resulted in recommended modifications to the default exclusion zone. Statoil seeks to adopt the following exclusion zones, based on direction from BOEM:

Exclusion Zones

- 500 m for NARWs (same as the watch zone)
- 100 m for large whales (other than NARWs), including beaked whales and Kogia, and for harbor porpoises
- 50 m for all other marine mammals and sea turtles

A monitoring zone will be established and continuously monitored to implement vessel strike avoidance measures outlined above. This distance will be field verified prior to the start of the survey program.

Monitoring Zones

- 500 m for North Atlantic right whales (NARWs)
- 200 m for all other marine mammals

For geotechnical survey activities, field studies conducted off the coast of Virginia (Tetra Tech 2014) to determine the underwater noise produced by borehole drilling and CPTs confirm that these activities (including vibracore sampling) do not result in underwater noise levels that are harmful or harassing to marine mammals (i.e., do not exceed NOAA current Level A and Level B harassment thresholds for marine mammals). Given the recent communications with NOAA on the normal operations of vessels and the lack of acoustic impact from vibracore sampling and CPT, a departure request from lease stipulations 4.4.7.1 and 4.4.7.2 is hereby requested. Statoil will implement all vessel strike avoidance measures described above.

4.2.4 Visual Monitoring Program

Visual monitoring of the established exclusion and monitoring zone(s) will be performed by qualified and NMFS-approved protected species observers (PSOs). Observer qualifications will include direct field experience on a marine mammal observation vessel and/or aerial surveys in the Atlantic Ocean/Gulf of Mexico. An observer team comprising a minimum of six NMFS-approved dual-role PSOs and certified PAM operators will rotate between visual and acoustic monitoring tasks. The PSOs/PAMs, operating in shifts, will be stationed aboard either the survey vessel or a dedicated PSO-vessel. PSOs and PAM operators will work in shifts such that no one monitor will work more than 4 consecutive hours without a 2 hour break or longer than 12 hours during any 24-hour period. During daylight hours the PSOs will rotate in shifts of 1 on and 3 off, and while during nighttime operations PSOs will work in pairs. The PAM operators will also be on call as necessary during daytime operations should visual observations become impaired. Each PSO will monitor 360 degrees of the field of vision. Statoil will provide resumes of all proposed PSOs and PAM operators (including alternates) to BOEM for review and approval by NMFS at least 45 days prior to the start of survey operations.

It will be the responsibility of the Lead PSO on duty to communicate the presence of marine mammals as well as to communicate and enforce the action(s) that are necessary to ensure mitigation and monitoring requirements are implemented as appropriate. PAM operators will communicate detected vocalizations to the Lead PSO on duty, who will then be responsible for implementing the necessary mitigation procedures.

PSOs will be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion zone using reticule binoculars. Visual monitoring will be conducted on a 24-hour basis. During daylight hours, one PSO will be on watch per shift, using the naked eye to scan around the survey vessel, paying particular attention to the Exclusion Zone surrounding the towed acoustic equipment and minimum separation zones around the vessel. Binoculars will be used to investigate points of interest which indicate the presence of marine mammals or sea turtles, and to confirm sightings where required. Reticule binoculars will be utilized to confirm distance of the animal(s) from the observer. Digital single-lens reflex camera equipment will be used to record sightings and verify species identification. During periods of darkness, PSOs / PAM Operators will work in pairs with one person monitoring exclusion zones visually and the other monitoring acoustically. Visual observations will be conducted using generation 3 night-vision binoculars with thermal imaging clip-ons. PSOs will make night-time observations from a platform with no visual barriers, due to the potential for the reflectivity from bridge windows to interfere with the use of the night-vision optics. Position data will be recorded using hand-held or vessel GPS units for each sighting.

Observations will take place from the highest available vantage point on the survey vessel. General 360-degree scanning will occur during the monitoring periods, and target scanning by the PSO will occur when alerted of a marine mammal presence.

Data on all PAM/PSO observations will be recorded based on standard PSO collection requirements. This will include dates and locations of construction operations; details of these operations; time of observation, location and weather; details of the sightings (e.g., species, age classification [if known], numbers, behavior); details of any mitigation steps taken and the duration of these; and details of any observed "taking" (behavioral disturbances or injury/mortality). The data sheet will be provided electronically to both NMFS and BOEM for review and approval prior to the start of survey activities. In addition, prior to initiation of survey work, all crew members will undergo environmental training, a component of which will focus on the procedures for sighting and protection of marine mammals and sea turtles. A briefing will also be conducted between the survey supervisors and crews, the PSOs, and Statoil. The purpose of the briefing will be to establish responsibilities of each party, define the chains of command, discuss communication procedures, provide an overview of monitoring purposes, and review operational procedures.

4.2.5 Passive Acoustic Monitoring

To support 24-hour survey operations, Statoil will include PAM as part of the project monitoring during the geophysical survey program during nighttime operations to provide for optimal acquisition of species detections at night. Acoustic monitoring will be conducted using Gardline's in-house PAM system. One PAM Operator will monitor the PAM, and will liaise closely with the PSOs to ensure effective monitoring. The PAM Operators will be on call as necessary during daylight hours should visual observations become impaired. This will be monitored onboard to ensure rest periods are not interrupted for prolonged periods. In addition, PAM systems shall be employed during daylight hours to support system calibration and PSO and PAM team coordination, as well as in support of efforts to evaluate the effectiveness of the various mitigation techniques (i.e., visual observations during day and night, compared to the PAM detections/operations).

Given the range of species that could occur in the Lease Area and Cable Route Area, and that these species vary with regard to their vocalization frequencies (high vs. low), the PAM system proposed under this Alternative Monitoring Plan will consist of an array of hydrophones with both three broadband (sampling mid-range frequencies of 1 kHz to 170 kHz) and three low-frequency hydrophones (sampling range frequencies of 10 Hz to 70 kHz).

Both PAM systems went through vigorous testing to prove it capable, specifically focusing on low frequency detection and localization. The system has been proven to be able to detect species such as North Atlantic right whale upsweep calls (100Hz) and whistles/moans (100Hz – 1.4kHz), and has detected probable humpback whale calls (c. 300Hz) during geotechnical operations and unidentified baleen whale calls during HRG operations.

Previous detections by the Mk4 and 4.1 systems include:

- North Atlantic right whale (Eubalaena glacialis) – capable of detecting upsweep calls (100Hz) and whistles (100Hz – 1.4kHz)
- Humpback whale (Megaptera novaeangliae)-probably humpback whale calls (c. 300Hz) detected during geotechnical operations.
- Bottlenose dolphin (Tursiops truncates) – detection at approximately 450m using Mk 4.
- Probable Fin whale

See Table 4-1 for a detailed list of specifications for the system proposed.

Table 4-1 Specifications for Gardline Mk4 and Mk4.1 PAM Systems

General		
Manufacturer	Gardline Geosurvey	Gardline Geosurvey
Model	MK 4 (Backup System)	MK 4.1 (Primary System)
Towed streamer section		
Length	N/A - integrated into tow cable	N/A - integrated into tow cable
Section diameter	14 mm over cable 24 mm over mouldings	14 mm over cable 24 mm over mouldings
Number of Hydrophones	6	6
Hydrophone type	Custom built by Gardline Geosurvey 3 low frequency 3 broadband	Custom built by Gardline Geosurvey 3 low frequency 3 broadband
Receive sensitivity (dB re 1 V/µPa)	-190 (low frequency) -170 (high frequency)	-190 (low frequency) -170 (high frequency)
Hydrophone separation	Hydrophone 1 and 2 6.75m Hydrophone 2 and 3 2.3m Hydrophone 3 and 4 1.2m Hydrophone 4 and 5 1.25m Hydrophone 5 and 6 2.1m	Hydrophone 1 and 2 10m Hydrophone 2 and 3 4.5m Hydrophone 3 and 4 0.5m Hydrophone 4 and 5 0.5m Hydrophone 5 and 6 4.5m
Preamplifiers	3 broadband, 3 low frequency	3 broadband, 3 low frequency
Preamplifier type	Sensor Technology SA-03	Sensor Technology SA-03
Depth sensor manufacturer	SensorTechnics	SensorTechnics
Tow cable		
Length	250 m	250 m
Diameter	14 mm	14 mm
Termination	37 pin CEEP Connectors	37 pin CEEP Connectors
Deck cable		
Length	100 m	100 m

Table 4-1 Specifications for Gardline Mk4 and Mk4.1 PAM Systems

Diameter	14 m	14 m
Termination	37 pin CEEP Connectors	37 pin CEEP Connectors

For the localizing of animals there are two limiting factors, hydrophone spacing (for low frequency) and speed of the computer (higher frequency). To localize, a sound is detected on one hydrophone, the wave is saved, and then its arrival is timed on the second hydrophone. The absolute bare minimum it can be is one quarter of a wavelength for detection.

Assuming 1500m/s speed of sound and 20 m spacing of hydrophones, it could potentially pick up 18.75Hz. In reality, it is expected to detect from 40-50Hz upwards.

Speed of sound through water = 1500 m/s
Hydrophone spacing = 20m
Therefore: 1500 / 20 /4 = 18.75Hz

As the computer stores the waveform as it travels from one hydrophone to another, a large amount of data is generated when dealing with higher frequencies, and can cause the computers to stall. As the high frequency hydrophones are set at 50cm separation and then connected to fast, custom built, high spec computers, they have been very effective at detecting harbour porpoise clicks at about 130 kHz with no lag.

The PAM operator(s) will monitor the hydrophone signals in real time both aurally (using headphones) and visually (via the monitor screen displays). PAM operators will communicate detections to the Lead PSO on duty who will ensure the implementation of the appropriate mitigation measure.

4.2.6 Pre-Clearance of the Exclusion Zone

Based upon precedent established by NMFS in recent IHA's issued for the Atlantic OCS and guidance provided by BOEM, Statoil requests a modification to Lease stipulation 4.4.6.4 to implement the following clearance periods prior to the initiation of ramp-up (Section 4.2.7).

- Sea turtles – 60-mins
- Large whales, including beaked whales and Kogia – 30-mins
- Small cetaceans and seals – 15-mins
- Small cetaceans and seals actively approaching the vessel when equipment is under full power – no requirement

During this period the exclusion zones will be monitored by the PSOs, using the appropriate visual technology and/or PAM. Ramp-up may not be initiated if any marine mammal or sea turtle is within its respective exclusion zone. If a marine mammal is observed within an exclusion zone during the pre-clearance period, ramp-up may not begin until the animal(s) has been observed exiting its respective zone or until the pre-clearance time period, described above, have elapsed with no further sightings

4.2.7 Ramp-Up Procedures

Where technically feasible, a ramp-up procedure will be used for HRG survey equipment capable of adjusting energy levels at the start or re-start of HRG survey activities. A ramp-up procedure will be used at the beginning of HRG survey activities in order to provide additional protection to marine mammals near the Survey Area by allowing them to vacate the area prior to the commencement of survey equipment use. The ramp-up procedure will not be initiated during periods of inclement conditions if the exclusion zone cannot be adequately

monitored by the PSOs using the appropriate visual technology (e.g., reticulated binoculars, night vision equipment) and/or PAM for a 60-minute period. A ramp-up would begin with the power of the smallest acoustic HRG equipment at its lowest practical power output appropriate for the survey. When technically feasible the power would then be gradually turned up and other acoustic sources added in way such that the source level would increase in steps not exceeding 6 decibels (dB) per 5-minute period.

Ramp-up activities will be delayed if a marine mammal(s) enters an exclusion zone(s). Ramp-up will continue if the animal has been observed exiting the exclusion zone or until an additional time period has elapsed with no further sighting (i.e. 15 minutes for delphinoid cetaceans and pinnipeds and 30 minutes for all other species).

4.2.8 Shut-Down and Power-Down Procedures

The exclusion and monitoring zone around the noise-producing activities (HRG survey equipment) will be maintained, as previously described, by PSOs and at night by PAM operators for the presence of marine mammals and sea turtles before, during, and after any noise-producing activity. The vessel operator must comply immediately with any call for shutdown by the Lead PSO. Any disagreement should be discussed only after shutdown.

Statoil proposes to implement the following waiting periods, following a shutdown triggered by encroachment of a marine mammal or sea turtle in the exclusion zones described above in Section 4.2.3.

- Sea turtles – 60-mins
- Large whales, including beaked whales and Kogia – 30-mins
- Small cetaceans and seals – 15-mins
- small cetaceans and seals actively approaching the vessel when equipment is under full power – no requirement

Subsequent restart of the electromechanical survey equipment must use the ramp-up procedures described above and may only occur following clearance of the exclusion zone for the durations described above.

If the HRG sound source (including the sub-bottom profiler) shuts down for reasons other than encroachment into the exclusion zone by a marine mammal or sea turtle including but not limited to a mechanical or electronic failure, resulting in the cessation of sound source for a period greater than 20 minutes, a restart for the HRG survey equipment (including the sub-bottom profiler) is required using the full ramp-up procedure described in Section 4.2.6. If the pause is less than less than 20 minutes, the equipment may be restarted as soon as practicable at its operational level as long as visual surveys were continued diligently throughout the silent period and the exclusion zone remained clear of marine mammals and sea turtles.

A Mitigation and Monitoring Communications Flow Diagram is provided in Appendix B to summarize the commitments described above.

If a North Atlantic right whale vocalization is detected by the PAM system, but cannot be localized, HRG survey equipment will be immediately shut down. Ramp up procedures may only begin if the right whale is confirmed to be beyond the 500m exclusion zone, or the vocalization has stopped for at least 30 minutes.

4.2.9 Calibration

A standard technique will be employed to calibrate visual monitoring equipment, whenever adequate objects such as other vessels, navigation buoys, and fixed structures are available. The ship's radar will be used to

measure "true" distances which will be compared to measurements taken using reticule binoculars. The distance measuring equipment will be calibrated against objects at a variety of ranges.

The Mark 4.1 will be calibrated in Gardline workshop using a dunk tank for underwater testing and calibrations. Each hydrophone element will be individually calibrated against a reference hydrophone, pre-calibrated by National Physic Laboratory, UK to ISO 17025 standard in the frequency range between 1 kHz to 150 kHz. This frequency range is considered to have spectral coverage for most species in the survey area. A total of 23 1/3 octave frequency bands will be tested individually for calibrations. The system was last calibrated in 31st May 2016.

For low frequency below 1 kHz, the hydrophone sensitivity is extrapolated based on its typical performance in the mid frequency response. This is due to the limitation of existing technique to effectively measure the low frequency wavelength underwater. For example, a 20 Hz wave underwater has wavelength 75m, the measuring facility dimension must be comparable to this wavelength to reproduce the calibration signal consistently and accurately. Thus making a whole system calibration process very difficult and expensive. However, the Mk4 system has been proven previously to show good detection from Northern right whale and Fin whale calls, which is in the 20-70 Hz region.

4.2.10 Reporting

Statoil will provide the following reports as necessary during survey activities:

- Statoil will contact BOEM and NMFS within 24 hours of the commencement of survey activities and again within 24 hours of the completion of the activity.
- Any observed significant behavioral reactions (e.g., animals departing the area) or injury or mortality to any marine mammals must be reported to BOEM and NMFS within 24 hours of observation. Dead or injured protected species (e.g., marine mammals, sea turtles and sturgeon) are reported to NMFS Northeast Region's Stranding Hotline (800-900-3622) within 24 hours of sighting, regardless of whether the injury is caused by a vessel. In addition, if the injury of death was caused by a collision with a project related vessel, Statoil will ensure that BOEM and NMFS are notified of the strike within 24 hours. Statoil will use the form included as Appendix A to Addendum C of the Lease to report the sighting or incident. If Statoil is responsible or the injury or death, the vessel must assist with any salvage effort as requested by NMFS.
- Within 90 days after completion of the marine site characterization survey activities, a final technical report will be provided to BOEM and NMFS that fully documents the methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of listed marine mammals and sea turtles that may have been taken during survey activities, and provides an interpretation of the results and effectiveness of all monitoring tasks.

Statoil will comply with the PSO reporting procedures as detailed in Section 6.

5.0 COMMUNICATION WITH FISHERIES

Lease Stipulation 4.1.5 requires that Statoil develop a publicly available Fisheries Communications Plan (FCP) that describes the strategies that Statoil intends to use for communicating with fisheries stakeholders prior to and during activities in support of the submission of a plan. The FCP presents Statoil's proposed approach to outreach with the fishing industry in relation to the development of the Project. The FCP for survey activities will be made available to the public at www.empirewind.com prior the commencement of survey activities.

5.1 Fisheries Liaison Officers and Fishing Industry Representatives

Statoil has contracted with Sea Risk Solutions LLC to provide Fisheries Liaison Officer(s) (FLO) to the Project. Sea Risk Solutions leverages experience, technology, innovation, and people skills to mitigate risks and serve as a bridge among marine sectors. The lead FLO for the Project will be:

Stephen Drew
Sea Risk Solutions LLC
sdrew@searisksolutions.com
Tel +1 908 339 7439

Mr. Drew founded Sea Risk Solutions in 2013, after 15 years developing and managing the Marine Liaison program for a major subsea cable supplier. Steve has managed risk mitigation at cable landing sites in 25 countries and served 5 years on the International Cable Protection Committee Board of Directors. Fluent in English and Spanish, he also works in Portuguese and French. Prior experience includes Fishery Industry Officer for the United Nations Food and Agriculture Organization; Fishery Observer Program Manager; and commercial fisherman. Steve holds B.S. and M.M.A. (Marine Affairs) degrees from the University of Rhode Island.

Fishing Industry Representatives (FIRs) will be established as the main point of contact within a fishing industry organization. These representatives should represent the views of the fishermen within his or her remit. The FIRs must have the backing and support of the fisheries stakeholders they represent. Statoil will provide the names and contact information of the FLO and FIR to BOEM prior to commencement of surveys.

Where required and appropriate, Fisheries Liaison Representatives will be present on vessels that are working on behalf of Statoil in the wind farm related activities, for example survey vessels and installation vessels. The main purpose is to ensure good communications with fishing vessels encountered during survey activities. This may be for the purpose of disseminating information, responding to queries from fishing vessels and acting as a conduit for information offshore between the FLO, FIR and fisheries stakeholders within or near the site.

5.1.1 Fisheries Liaison Strategy

Regular, open consultation will be key to ensuring all parties are well informed, are able to contribute to the discussions and can work towards the joint objective of co-existence.

Liaison activities will be primarily based on best practice guidance and feedback from the fishing industry through consultation. It will also draw on consultation from fisheries bodies, regulators, ports and harbors and legislation, as well as previous experiences of the Statoil team with fisheries liaison work in the offshore wind industry. The best practice guidance will include, but not be limited to:

- Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf, BOEM 2014-654 (BOEM 2014);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison - Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW), UK (FLOWW 2014); and
- Fishing and Submarine Cables - How the fishing and submarine cable communities can work together – published by the International Submarine Cable Protection Committee.

5.1.2 Communication Channels

Notices and information for fishermen will be distributed via the following options:

- Via the FIRs where relevant;
- Fishermen's associations;
- Directly from the FLO to individual fishermen not represented by an FIR, but identified on the FLO's database;
- USCG Notice to Mariners;
- Electronic email distribution to commercial fishing permit holders (NOAA or state agencies);
- Statoil's relevant website page;
- Local harbor masters;
- Newsletters; and
- Fishing news publications.

6.0 REGULATORY OVERVIEW

The Lease stipulates various pre-survey, survey, and post-survey requirements. Details regarding Statoil's compliance with the Lease requirements are detailed in the following tables. Table 6-1 summarizes Statoil's pre-survey compliance. Table 6-2 summarizes compliance with standard operating conditions during survey activities. Table 6-3 summarizes reporting requirements. All stipulations are summarized. See OCS-A 0512 for complete stipulations.

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Table 6-1 Pre-Survey Conditions

Addendum "C" Stipulation	Pre-Survey Conditions	Compliance Statement
2.1.1 Survey Plan(s)	Survey Plan to be submitted if site assessment activities will be conducted.	The Survey Plan is hereby submitted.
2.1.2 Pre-Survey Meeting(s) with the Lessor	Participate in a pre-survey meeting with BOEM at least 60 days prior to initiation of survey activities in support of the submission of a plan. A QMA must be present.	The Pre-Survey meeting with BOEM was conducted on December 20, 2017.
3.2.1 General	The United States reserves the right to temporarily suspend operations and/or require evacuation on this lease in the interest of national security.	Statoil understands that the United States reserves the right to temporarily suspend operations and/or require evacuation on this lease in the interest of national security.
3.2.4 Lessee Point-of-Contact for Evacuation/Suspension Notifications	Provide BOEM with a Point of Contact for suspension or evacuation notifications.	Prior to the start of surveys, Statoil will provide contact information for the on-site representative that will be aboard the survey vessel.
3.2.5 Coordination with Command Headquarters	Establish and maintain early contact and coordination with the appropriate command headquarters to avoid or minimize conflicts with military operations.	Prior to the start of surveys, Statoil will contact the U.S. Department Navy Fleet Forces Command: Jim Casey, Encroachment Program Manager 1562 Mitscher Ave, Suite 250 Norfolk, VA 23551 Tel. (757) 836-5040 james.casey.ctr@navy.mil
3.3 Electromagnetic Emissions	In any designated defense operation area, warning area, or water test area, coordinate the electromagnetic emissions associated with any survey activities with appropriate command headquarters. Ensure that all electromagnetic emissions associated with survey activities are controlled as directed by the commander of the appropriate command headquarters.	To be addressed for any relevant survey activities when coordinating with USNORTHCOM (see also the compliance statement for Lease Stipulation 3.2.5).
4.1.1 Responsibilities Briefing	Prior to the start of operations, the Lessee must hold a briefing to establish responsibilities of each involved party and review all necessary procedures. The briefing must include all relevant personnel, crew members and PSOs.	Statoil will hold a briefing prior to the start of operations to establish responsibilities of all parties and review all procedures.
4.1.2 Familiarity with Addendum C	All vessel operators and crew members, including PSOs, must be familiar with the requirements specified in Addendum C.	Statoil will ensure that all crew members, including PSOs, are familiar with and understand the requirements in Addendum C.
4.1.3 Availability of Addendum C	The Lessee must ensure that a copy of Addendum C is available on every project-related vessel.	Statoil will ensure that a copy of Addendum C is available on every project-related vessel.

Table 6-1 Pre-Survey Conditions

Addendum "C" Stipulation	Pre-Survey Conditions	Compliance Statement
4.1.5 FCP and Fisheries Liaison	The Lessee must develop a publicly available FCP that describes the strategies that the Lessee intends to use for communicating with fisheries stakeholders prior to and during activities in support of the submission of a plan. The FCP must include the contact information for an individual retained by the Lessee as its primary point of contact with fisheries stakeholders (i.e., Fisheries Liaison). If the Lessee develops a project website, the FCP must be posted on the Lessee's project website. If the Lessee does not develop a project website, the FCP must be made available to the Lessor and the public upon request.	The Fisheries Communication Plan is in development and will be posted to the Empire Wind website in advance of the start of survey operations. See Section 5.0. The lead FLO for the Project is: Stephen Drew Sea Risk Solutions LLC sdrew@searisksolutions.com Tel +1 908 339 7439
4.2.1 Vessel Strike Avoidance Measures	The Lessee must ensure that all vessels conducting activities in support of plan submittal, including those transiting to and from local ports and the lease area, comply with the vessel-strike avoidance measures specified in Section 4.2, except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk.	Statoil will ensure that all vessels comply with the vessel-strike avoidance measures specified in Section 4.2.
4.3.3 Tribal Pre-Survey Meeting	The Lessee must invite the Shinnecock Indian Nation to a tribal pre-survey meeting. The meeting must be held subsequent to the pre-survey meeting with the Lessor. Invitation to the tribal pre-survey meeting must be made at least 15 calendar days prior to the date of the proposed tribal pre-survey meeting. The meeting must be schedule at least 30 days prior to the start of survey activities. The anticipated date for the meeting must be identified in the timeline of activities described in the applicable survey plan (see 2.1.1).	Pre-Survey Meeting coordination with the Shinnecock Indian Nation occured in mid-January and the tribal pre-survey meeting was held on January 31, 2018.
4.3.5 Monitoring and Avoidance	The Qualified Marine Archaeologist must be afforded the opportunity to be present during HRG surveys and bottom-disturbing activities to ensure avoidance of potential archaeological resources. The Qualified Marine Archaeologist, upon request, should be provided the opportunity to inspect data quality.	The QMA will be afforded the opportunity to be present during HRG surveys and bottom-disturbing activities. The QMA will also be provided the opportunity to inspect data quality.
4.3.6 No Impact without Approval	The Lessee must not knowingly impact a potential archaeological resource without BOEM's prior approval.	Statoil will avoid conducting bottom disturbing activities in areas of known archaeological resources. The QMA will review any locations where bottom disturbing activities may occur and certify that the proposed activities will not impact potential archaeological resources.

Table 6-1 Pre-Survey Conditions

Addendum "C" Stipulation	Pre-Survey Conditions	Compliance Statement
4.4.6.2 Field Verification of HRG Survey Exclusion Zone	The Lessee must submit to the Lessor the results of field verification to verify the exclusion zone for the HRG survey equipment operating below 200 kHz. If no applicable data are available, the Lessee must conduct field verification of the exclusion zone for HRG survey equipment operating below 200 kHz. As part of such field verification, the Lessee must take acoustic measurements at a minimum of two reference locations and in a manner that is sufficient to establish the following: source level (Peak, SEL, and RMS sound levels at 1 m), pattern of spreading loss, and the sound-exposure distance for ear injury for each marine mammal hearing group, sea turtles, and fish. The distance to the 166, 160, and 150 dB RMS behavioral thresholds (Level B harassment) must also be reported. The first location must be at a distance of 200 m from the sound source, and the second location must be as close to the sound source as technically feasible. The Lessee must take these sound measurements at the reference locations at two depths (i.e., a depth at mid-water and a depth at approximately 3.28 ft (1 m) above the seafloor). The Lessee must report the field verification results to the Lessor in the applicable survey plan(s), unless otherwise authorized by the Lessor.	Please see Section 4.1 and Appendix B.
4.4.6.3 Modification of Exclusion Zone Per Lessee Request	Results from the field verification may be used to modify the exclusion zone. Any new exclusion zone radius must be based on the most conservative measurement (i.e., the largest safety zone configuration) of the target Level A or Level B harassment acoustic threshold zone as defined by NMFS. The Lessee must obtain approval from BOEM of any new exclusion zone before it may be implemented. See Lease for complete detail.	Statoil may request a modification to the exclusion zone from BOEM and NMFS based upon the field verification results.
4.5.6 Field Verification Plan for HRG Survey Exclusion Zone	No later than 45 calendar days prior to the commencement of required field verification activities, the Lessee must submit a plan for verifying the sound source levels of any electromechanical survey equipment operating at frequencies below 200 kHz.	Please see Section 4.1 and Appendix B.
4.5.7 Marine Mammal Protection Act Authorization(s)	If the Lessee is required to obtain an authorization pursuant to section 101(a)(5) of the Marine Mammal Protection Act prior to conducting survey activities in support of plan submittal, the Lessee must provide to the Lessor a copy of the authorization prior to commencing these activities.	Statoil has submitted an IHA petition to the NMFS, which is currently under review. A copy of the authorization will be provided to the lessor prior to commencing the survey activities.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
4.2 Vessel Strike Avoidance Measures		
4.2.2	The Lessee must ensure that vessel operators and crew maintain a vigilant watch for cetaceans, pinnipeds, and sea turtles and slow down or stop their vessels to avoid striking these protected species.	Survey vessel crew members responsible for navigation duties will receive site-specific training on marine mammal and sea turtle sighting/reporting and vessel strike avoidance measures. The training program will be provided to jurisdictional agencies for review and approval prior to the start of surveys. Confirmation of the training and understanding of the requirements will be documented on a training course log sheet onboard the vessel with individuals signing off to state that training has been received. Signing the log sheet will certify that the crew members understand and will comply with the necessary requirements throughout the survey event. Throughout all survey operations, Statoil will monitor NMFS North Atlantic right whale reporting systems.
4.2.3	The Lessee must ensure that all vessel operators comply with 10 knot (18.5 km/hr) speed restrictions in any Dynamic Management Area (DMA).	
4.2.4	The Lessee must ensure that all vessel operators comply with 10 knot (18.5 km/hr) speed restrictions in any DMA. In addition, must ensure that vessels 65 ft (19.8 m) in length or greater, operating from November 1 through April 30 will operate at speeds of 10 knots (18.5 km/hr) or less.	
4.2.5	The Lessee must ensure that all vessel operators reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of non-delphinoid cetaceans are observed near an underway vessel.	
4.2.6 North Atlantic Right Whales		
4.2.6.1	The Lessee must ensure all survey vessels maintain a separation distance of 1,640 ft (500 m) or greater from any sighted North Atlantic right whale (NARW).	An observer team comprising a minimum of four PSOs and two certified PAM operators, operating in shifts, will be stationed aboard the survey vessel or an alternate monitoring vessel. It will be the responsibility of the Lead PSO on duty to communicate the presence of marine and/or sea turtle species as well as to communicate and enforce the action(s) that is necessary to ensure mitigation and monitoring requirements are implemented as appropriate.
4.2.6.2.1	If underway, vessels must steer a course away from any sited NARW at 10 knots (18.5 km/hr) or less until the 1,640 ft (500 m) minimum separation distance has been established (except as provided in stipulation 4.2.6.2.2).	See compliance statements for Lease Stipulations 4.2.6.1, 4.4.4 and 4.4.5.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
4.2.6.2.2	If a NARW is sited in a vessel's path, or within 328 ft (100 m) to an underway vessel, the underway vessel must reduce speed and shift the engine to neutral. The Lessee must not engage the engines until the NARW has moved outside of the vessel's path and beyond 328 ft (100 m).	
4.2.6.2.3	If a vessel is stationary, the vessel must not engage engines until the NARW has moved beyond 328 ft (100 m), at which point the Lessee must comply with stipulation 4.2.6.2.1.	
4.2.7 Non-Delphinoid Cetaceans other than the North Atlantic Right Whale, 4.2.8 Delphinoid Cetaceans and Pinnipeds, and 4.2.9 Sea Turtles		
4.2.7.1	The Lessee must ensure all vessels maintain a separation distance of 328 ft (100 m) or greater from any sighted non-delphinoid cetacean.	See compliance statements for Lease Stipulations 4.2.6.1, 4.4.4 and 4.4.5.
4.2.7.2.1	If any non-delphinoid cetacean is sighted, the vessel underway must reduce speed and shift the engine to neutral, and must not engage the engines until the non-delphinoid cetacean has moved beyond 328 ft (100 m).	
4.2.7.2.2	If a vessel is stationary, the vessel will not engage engines until the non-delphinoid cetacean has moved out of the vessel's path and beyond 328 ft (100 m).	
4.2.8.1	The Lessee must ensure that all vessels underway do not divert to approach any delphinoid cetacean and/or pinniped.	
4.2.8.2	The Lessee must ensure that if a delphinoid cetacean and/or pinniped approaches any vessel underway, the vessel underway must avoid excessive speed or abrupt changes in direction to avoid injury to the delphinoid cetacean and/or pinniped.	
4.2.9.1	The Lessee must ensure all vessels maintain a separation distance of 164 ft (50 m) or greater from any sighted sea turtle.	
4.3.7 Post-Review Discovery Clauses	If while conducting site characterization activities a potential archaeological resource is discovered, bottom disturbing activities will be immediately halted; BOEM must be notified within 24 hours of discovery and notified in writing within 72 hours of discovery; the location will be kept confidential; any additional investigations may be conducted as directed by BOEM.	While conducting site characterization activities, Statoil will follow the Post Discover Clauses, outlined in Stipulation 4.3.7.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
General Geological and Geophysical (G&G) Survey Requirements		
4.4.1 General	The Lessee must ensure that all vessels conducting activities in support of a SAP submittal comply with the G&G survey requirements specified in stipulation 4.4, except under extraordinary circumstances when complying with these requirements would put the safety of the vessel or crew at risk.	See compliance statement for Lease Stipulation 4.1.2.
4.4.2 Visibility	The Lessee must not conduct G&G surveys in support of a SAP submittal at any time when lighting or weather conditions (e.g., darkness, rain, fog, sea state) prevents visual monitoring of the HRG survey exclusion zone (see 4.4.6) or the geotechnical exploration exclusion zone (see 4.4.7) except as allowed under 4.4.3.	Section 4.2.4 of the Survey Plan and the compliance statement for Lease Stipulation 4.4.5 provide details on the visual observation equipment that will be available to the PSOs to support the monitoring of the exclusion zones 24-hours per day. As described in the compliance statement for Lease Stipulation 4.4.3, Statoil has provided an Alternative Monitoring Plan for conducting survey operations at night that include the use of PAM, NVDs and IR (see Section 4.2). In addition, as detailed in the compliance statement for Lease Stipulation 4.4.4, Statoil will employ an observer team comprising a minimum of four dual role PSOs /PAM operators to support survey activities at night and/or during periods when visual observations may be impaired. It will be the responsibility of the Lead PSO on duty to communicate whether the conditions are suitable to affectively monitor the exclusion zone(s) throughout the survey day. HRG Surveys may not commence until the Lead PSO on duty confirms visual suitability and the exclusion zone(s) has been clear of all marine mammals and sea turtles for a period of 30 minutes. If the exclusion zone(s) becomes obstructed once survey operations have commenced, the Lead PSO will call for a shutdown of survey operations until the zone(s) is once again visually clear. See also compliance statements for Lease Stipulations 4.4.6.4 and 4.4.6.9.1.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
4.4.3 Modification of Visibility Requirement	If the Lessee intends to conduct G&G surveys operations in support of SAP submittal at night or when visual observation is otherwise impaired, it must submit to the Lessor an alternative monitoring plan detailing the alternative monitoring methodology (e.g., active or passive acoustic monitoring technologies). The Lessor may, after consultations with the National Marine Fisheries Service (NMFS), decide to allow the Lessee to conduct G&G surveys in support of plan submittal at night or when visual observation ID is otherwise impaired using the proposed alternative monitoring methodology.	Statoil has proposed an Alternative Monitoring Plan (See section 4.2 of this Survey Plan) for conducting HRG surveys at night.
4.4.4 Protected-Species Observer	The Lessee must ensure that the exclusion zone for all G&G surveys performed in support of a SAP submittal is monitored by one or more NMFS-approved PSOs. The number of PSOs must be sufficient to effectively monitor the exclusion zone at all times. In order to ensure effective monitoring, PSOs must be on watch for no more than 4 consecutive hours, with at least a 2-hour break after a 4-hour watch, unless otherwise accepted by the Lessor. PSOs must not work for more than 12 hours in a 24-hour period. Prior to the scheduled start of the surveys performed in support of plan submittal, the Lessee must provide to the Lessor a list of PSOs currently approved by NMFS for G&G surveys. For PSOs not currently approved by NM FS, the Lessee must provide to the Lessor PSO resumes, no later than 45 calendar days prior to the scheduled start of such surveys. If additional PSO approvals are required after this time, the Lessee must provide the additional PSO resumes to the Lessor at least 15 calendar days prior to each PSO's start date. The Lessor will send the PSO resumes to NMFS for approval.	Statoil will employ an observation team of approved PSOs capable of providing visual mitigation and certified in the use of PAM to provide alternating shifts during 24-hour survey operations. See Section 4.2. Statoil will provide resumes of all proposed PSOs and PAM operators (including alternates) to BOEM for review and approval by NMFS at least 45 days prior to the start of survey operations. Should additional staff need to be added to Statoil's list of qualified PSOs and PAM operators once survey activities have commenced, Statoil will submit the resume(s) of the new proposed personnel to BOEM for review and approval by NMFS at least 15 days prior to the PSO's and/or PAM operator's start date.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
4.4.5 Observation Location and Optical Device Availability	The Lessee must ensure that monitoring occurs from the highest available vantage point on the associated operational platform, allowing for 360-degree scanning. The Lessee must ensure that each PSO has access to reticle binoculars and other suitable equipment to adequately perceive and monitor protected species within the exclusion zone during surveys conducted in support of plan submittal.	PSOs will be equipped with binoculars and have the ability to estimate distances to marine mammals located in proximity to the vessel and/or exclusion. Reticulated binoculars will also be available to PSOs for use as appropriate based on conditions and visibility to support the siting and monitoring of marine species. Digital single-lens reflex camera equipment will be used to record sightings and verify species identification. During night operations, PAM, night-vision equipment, and infrared technology will be used. PSOs will make night-time observations from a platform with no visual barriers, due to the potential for the reflectivity from bridge windows to interfere with the use of the night-vision optics. Position data will be recorded using hand-held or vessel GPS units for each sighting (see also Section 4.2 of this Survey Plan).
4.4.6.1 Establishment of Default Exclusion Zone	The Lessee must ensure that a 656-ft (200-m) default exclusion zone for cetaceans, pinnipeds, and sea turtles will be monitored by a PSO. In the case of the NARW, the minimum separation distance of 1,640 ft (500 m), as required under stipulation 4.2.6.1, must be observed.	As described in Section 4.2, BOEM has recommended modifications to the default exclusion zones.
4.4.6.4 Clearance of Exclusion Zone	The Lessee must ensure that active acoustic sound sources will not be activated until the PSO has reported the exclusion zone clear of all marine mammals and sea turtles for 60 minutes.	Ramp up procedures may begin, once the PSO has established the exclusion zone is clear of marine mammals and sea turtles as described in Section 4.2.
4.4.6.5 HRG Survey Mid-Atlantic SMAs Right Whale Monitoring	The Lessee must ensure that between November 1 and April 30, vessel operators monitor NMFS North Atlantic Right Whale reporting systems (e.g., the Early Warning System, Sighting Advisory System, and Mandatory Ship Reporting System) for the presence of North Atlantic right whales during HRG survey operations.	Between watch shifts, members of the monitoring team will consult NMFS North Atlantic right whale reporting systems for the presence of North Atlantic right whales throughout survey operations. However, the proposed survey activities will occur outside of the SMA located off the coasts of New Jersey and New York.
4.4.6.6 Dynamic Management Area Shutdown Requirement	The Lessee must ensure that the vessel cease HRG survey activities within 24 hours of NMFS establishing a DMA in the Lessee's HRG survey area. HRG surveys may resume in the affected area aft.er the DMA has expired.	It will be the responsibility of the Lead PSO on duty to monitor the identified NMFS NARW reporting systems for the establishment of a DMA. If NMFS should establish a DMA within the HRG survey area, the Lead PSO will notify Statoil immediately so that survey operation can be shut down and/or altered to avoid the DMA within the stated 24-hour window.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
4.4.6.7 Electromechanical Survey Equipment Ramp-Up	The Lessee must ensure that, when technically feasible, a "ramp-up" of the electromagnetic survey equipment will occur at the start or re-start of HRG survey operations. A ramp-up must begin with the power of the smallest acoustic equipment for the HRG survey at its lowest power output. The power would then be gradually turned up and other acoustic sources added in way such that the source level would increase in steps not exceeding 6 dB per 5-minute period.	Statoil confirms that the shallow and deep water sub bottom profiling equipment as outlined in Section 3.2 of this document has the technical capability to be ramped-up. All other equipment operates in either an "on or off" mode and as such it is not possible to ramp up the other equipment listed in these sections. It will be the responsibility of the Lead PSO on duty to authorize the ramp-up of HRG survey equipment.
4.4.6.8 Shut Down for Non-Delphinoid Cetaceans and Sea Turtles	If a non-delphinoid cetacean or sea turtle is sighted at or within the exclusion zone, an immediate shutdown of the electromechanical survey equipment is required. The vessel operator must comply immediately with such call by the observer. Any disagreement should be discussed only after shutdown. Subsequent restart of the electromechanical survey equipment must use the ramp-up procedures described in 4.4.6.7 and must only occur following clearance of the exclusion zone of all marine mammals and sea turtles for 60 minutes as described in 4.4.6.4.	Statoil has given the Lead PSO on duty the authority to communicate and enforce an equipment shutdown and subsequent ramp-up during HRG survey operations. A communications flow diagram is provided in Appendix B of this Survey Plan. Revised shut down requirements provided by BOEM are incorporated in Section 4.2.
4.4.6.9 Power Down for Delphinoid Cetaceans and Pinnipeds	If a delphinoid cetacean or pinniped is sighted at or within the exclusion zone, the electromechanical survey equipment must be powered down to the lowest power output that is technically feasible. The vessel operator must comply immediately with such call by the observer. Any disagreement or discussion should occur only after the power-down. Subsequent restart of the electromechanical survey equipment must use the ramp-up procedures described in 4.4.6.7 and may occur only after (1) the exclusion zone is clear of delphinoid cetaceans and pinnipeds or (2) a determination by the PSO after a minimum of 10 minutes of observation that the delphinoid cetacean and/or pinniped is approaching the vessel or towed equipment at a speed and vector that indicates voluntary approach to bow-ride or chase towed equipment.	See compliance statement for Lease Stipulation 4.4.6.4, 4.4.6.8 and Appendix B of this Survey Plan. Revised shut down requirements provided by BOEM are incorporated in Section 4.2.

Table 6-2 Standard Operating Conditions

Addendum "C" Stipulation	Vessel Operations Conditions	Compliance Statement
4.4.6.9.1 Pauses in Electromechanical Survey Sound Source	The Lessee must ensure that if the electromechanical sound source shuts down for reasons other than encroachment into the exclusion zone by a non-delphinoid cetacean or sea turtle including but not limited to a mechanical or electronic failure, resulting in the cessation of sound source for a period greater than 20 minutes, then the Lessee must restart the electromechanical survey equipment using the full ramp-up procedures and clearance of the exclusion zone of all cetaceans, pinnipeds and sea turtles for 60-minutes. If the pause is less than 20 minutes, the Lessee must ensure that restart of the electromechanical survey equipment commences only after clearance of the exclusion zone, as described in 4.4.6.4, and the implementation of ramp-up procedures, as described in 4.4.6.7. If the shutdown is less than 20 minutes, the equipment may be restarted as soon as practicable at its operational level as long as visual surveys were continued diligently throughout the silent period and the exclusion zone remained clear of marine mammals and sea turtles. If visual surveys were not continued diligently during a shutdown of 20 minutes or less, the Lessee must clear the exclusion zone, as described in 4.4.6.4, and implement ramp-up procedures, as described in 4.4.6.7, prior to restarting the electromechanical survey equipment.	See compliance statement for Lease Stipulation 4.4.6.4, 4.4.6.8 and Appendix B of this Survey Plan. Revised shut down requirements provided by BOEM are incorporated in Section 4.2.

Table 6-3 Reporting Requirements

Addendum "C" Stipulation	Lease Requirement	Compliance Statement
4.5.1 Field Verification of Exclusion Zone Preliminary Report for HRG Survey Equipment	The Lessee must report the results of field verification to verify the exclusion zone for the HRG survey equipment operating below 200 kHz to the Lessor and NMFS prior to using the HRG equipment during survey activities conducted in support of plan submittal. The Lessee must include in its report a preliminary interpretation of the results for all sound sources, which will include details of the operating frequencies, Sound Pressure Levels (measured in Peak, SEL, and RMS), the distance to the ear injury and behavior thresholds, frequency bands measured, as well as associated latitude/longitude positions, ranges, depths and bearings between sound sources and receivers.	Statoil will report the results of field verification to verify the exclusion zone for the HRG survey equipment operating below 200 kHz to BOEM and NMFS prior to conducting HRG survey activities.
4.5.2 Reporting Injured or Dead Protected Species	The Lessee must ensure that sightings of any injured or dead protected species (e.g., marine mammals, sea turtles or sturgeon) are reported to the Lessor, NMFS and the NMFS Greater Atlantic (Northeast) Region's Stranding Hotline (866-755-6622 or current) within 24 hours of sighting, regardless of whether the injury or death is caused by a vessel. In addition, if the injury or death was caused by a collision with a project-related vessel, the Lessee must notify the Lessor of the strike within 24 hours. The Lessee must use the form provided in Appendix A to ADDENDUM "C" to report the sighting or incident. If the Lessee's activity is responsible for the injury or death, the Lessee must ensure that the vessel assists in any salvage effort as requested by NMFS.	It will be the responsibility of the Lead PSO on duty to report the sightings of a dead and/or injured marine species to the Statoil Project Manager, and to complete the required sightings/incident form. It will be the responsibility of the Statoil Project Manager to make the appropriate notifications to NMFS via the Northeast Region's Stranding Hotline and, if necessary, to BOEM within 24 hours of the sighting/incident. If Statoil is responsible for the injury or death, they will work with NMFS to support the salvage effort, as necessary.
4.5.3 Reporting Observed Impacts to Protected Species	The Lessee must report any observed takes (as defined in 1.13) of listed marine mammals, sea turtles or sturgeon resulting in injury or mortality within 24 hours to the Lessor and NMFS. The Lessee must report any observations concerning any impacts on Endangered Species Act listed marine mammals, sea turtles or sturgeon to the Lessor and NMFS Northeast Region's Stranding Hotline within 48 hours. The Lessee must record injuries or mortalities using the form provided in Appendix A to ADDENDUM "C".	It will be the responsibility of the Lead PSO on duty to report the any impacts to an Endangered Species Act (ESA)-listed species to the Statoil Project Manager, and to complete the required form as provided in Appendix A to Addendum C of the Lease. It will be the responsibility of the Statoil Project Manager to make the appropriate notifications to the NMFS and BOEM within 48 hours of any observations concerning impacts to ESA listed species and within 24 hours of the take of any ESA listed species.

Table 6-3 Reporting Requirements

Addendum "C" Stipulation	Lease Requirement	Compliance Statement
4.5.4 Protected Species Observer Reports	The Lessee must ensure that the PSO record all observations of protected species using standard marine mammal PSO data collection protocols. The list of required data elements for these reports is provided in Appendix B to ADDENDUM "C".	Statoil will provide the PSO/PAM team with a standardized data sheet that contains all of the data elements required by Appendix B to Addendum C. The PSO/PAM team will be instructed to record all of the required data in the field using the standardized form. The data sheet will be provided to both BOEM and NFMS for review and approval prior to the start of survey activities. Statoil will review the data elements and sheet with the PSO/PAM team members during the site-specific training session.
4.5.5 Reports of G&G Survey Activities and Observations	The Lessee must provide the Lessor and NMFS with reports every 90 calendar days following the commencement of HRG and/or geotechnical exploration activities, and a final report at the conclusion of the HRG and/or geotechnical exploration activities. Each report must include a summary of survey activities, all PSO and incident reports (See Appendices A and B), and an estimate of the number of listed marine mammals and sea turtles observed and/or taken during these survey activities. The final report must contain a detailed analysis and interpretation of the sound source verification data, if such data was collected by the Lessee.	Statoil will work in coordination with the survey team and PSO/ PAM team to develop a final report summarizing the HRG survey activities and all PSO and PAM observer reports. This report will be provided to both BOEM and NMFS by Statoil within 90 calendar days following the commencement of survey activities.
4.6.1 Lighting Requirements	When conducting survey activities in support of plan submittal, the Lessee must use lighting only when necessary, and the lighting must be hooded downward and directed when possible, to reduce upward illumination and illumination of adjacent waters.	Statoil will comply with the lighting requirements to the maximum extent practicable in accordance with Health and Safety protocols established on the survey vessel.

Table 6-3 Reporting Requirements

Addendum "C" Stipulation	Lease Requirement	Compliance Statement
4.6.2 Annual Report of dead birds and bats	The Lessee must provide an annual report to the Lessor and U.S. Fish and Wildlife Service using the contact information provided as an Enclosure to this lease, or updated contact information as provided by the Lessor. This report must document any dead or injured birds or bats found during activities conducted in support of plan submittal. The first report must be submitted within 6 months of the start of the first survey conducted in support of plan submittal, and subsequent reports must be submitted annually thereafter until all surveys in support of plan submittal have concluded and all such birds and bats have been reported. If surveys are not conducted in a given year, the annual report may consist of a simple statement to that effect. The report must contain the following information: the name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. In addition to the Annual Report, the Lessee must report carcasses with Federal or research bands to the U.S. Geological Society Bird Band Laboratory, within 30 calendar days, using the following website: https://www.pwrc.usgs.gov/bbl/, or updated contact information as provided by the Lessor.	Statoil will comply with the reporting requirements regarding dead or injured birds or bats found during survey activities.

7.0 SCHEDULE

Table 7-1 Anticipated 2018 Schedule of Activities

Submittal/Action/Milestone	Lease Stipulation	Date
Submit Survey Plan	2.1.1	On or before December 1, 2017
Pre-Survey Meeting with BOEM	2.1.2	On or before December 30, 2017
Tribal Pre-Survey Meeting invitation	4.3.3	On or before January 15, 2018
Survey Contractor selected		On or before January 15, 2018
Submit list of PSOs and resumes	4.4.4	On or before January 15, 2018
Tribal Pre-Survey Meeting	4.3.3	On or before January 31, 2018
Conduct field verification of exclusion zone and submit results of field verification (at least 24 hours prior to the start of surveys)	4.5.6	On or before March 1, 2018
Start Survey		March 2, 2018

8.0 REFERENCES

Bureau of Ocean Energy Management (BOEM). (2013). *Guidelines for Submission of Spatial Data for Atlantic Offshore Renewable Energy Development Site Characterization Surveys.* United States Department of Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. February.

BOEM. (2014). *Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf: Final Report on Best Management Practices and Mitigation Measures.* United States Department of Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. July.

BOEM. (2015). *Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585.* United States Department of Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. July.

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APPENDIX A MARINE ARCHAEOLOGICAL DATA TRANSFER PROTOCOLS

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The Survey Contractor will have in place a QA/QC plan from data acquisition to data delivery to ensure all survey data are accurate and of sufficient resolution to meet BOEM "Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585" (March 2017). The QMA (SEARCH) will administer a secure .FTP site for transfer of all survey data (instructions provided when needed).

The QMA require the following data types and data acquisition frequencies in order to meet BOEM minimum standards for archaeological survey (all instruments will be interfaced to the proposed positioning system with ±0.1 meter horizontal and ±0.2 meter vertical precision):

- Gradiometer:
  - Maximum survey line spacing – 98 ft (30 m)
  - Maximum survey altitude – 20 ft (6 m)
  - Minimum acquisition frequency – 1 Hz
  - Data deliverable – .CSV format file including date, time, line name, x and y (corrected for layback), z (gradiometer reading), and gradiometer altitude for every magnetic data point (1 Hz)
- Side-Scan Sonar:
  - Minimum frequency – 600 kHz
  - Range – 100 percent overlap of adjacent survey line (98-ft [30-m] spacing)
  - Altitude – 10-20 percent of the range
  - File format – .XTF or other format deemed acceptable through pre-survey consultation
  - Data deliverable – raw unprocessed imagery and software configuration file
- Sub-Bottom Profiler:
  - Maximum survey line spacing – 98 ft (30 m)
  - Frequency – dependent upon environmental conditions, maximum depth of disturbance of the proposed undertaking, and potential depth of the local Holocene-Pleistocene unconformity
  - File format –SEG-Y, .XTF, or other format deemed acceptable through pre-survey consultation
  - Data deliverable – raw unprocessed imagery and software configuration file
- Additional Deliverables:
  - Daily survey logs/notes
  - Instrument layback calculations
  - Survey methodology

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APPENDIX B FIELD VERIFICATION PLAN

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8 ACOUSTIC FIELD VERIFICATION

8.1 ITT Requirements

As per condition 4.4.6.2 of the Lease OCS-A 0512 and the clarification submitted to Statoil, Gardline understand that a field verification test (FVT) must be conducted prior to commencing any HRG acquisition. Due to different equipment being utilized onboard the two proposed vessels it is understood that a FVT will likely need to be conducted on both the Shearwater and Ocean Researcher.

All HRG survey equipment operating below 200kHz will need to be verified prior to data acquisition to confirm the suitability of the 200m exclusion zone. Tables 13 and 14 detail the equipment that will operate below this frequency during each survey. This equipment list will be updated as necessary based on the final specifications provided by the survey contractor and will be provided to BOEM prior to the start of surveys.

8.2 Field Verification Methodology

Static hydrophone arrays will be deployed at two locations within the Lease Area ensuring a backup system. At each mooring location the hydrophones will be deployed at two water depths -- a depth at mid-water and a depth at approximately 1m (3.3 ft.) above the seafloor. The primary hydrophone location will be positioned around 50m from the vessel survey line to ensure sufficient clearance from survey vessel, whilst a second reference location will be offset from the primary mooring by approximately 150 m, and be used as a backup for initial field verification. The hydrophones will be housed in Autonomous Recording Units (ARUs) and attached to a mooring line secured by a bottom anchor, with a high visibility marker buoy on the sea surface. A depiction of the proposed deployment configuration is provided in Figure 2. To ensure the accuracy of the hydrophone measurements, a calibration tone at 250Hz will be recorded for each hydrophone before and after the measurement period using an onboard pistonphone. In addition our ARUs are calibrated yearly using an ISO 17025 standard reference and source hydrophone over the frequency ranges of 1.5kHz to 125kHz.

The precise deployment location for the moorings will be established in advance using known bathymetric, tidal and sediment data. Once in the field, if hazards are identified at the proposed deployment location, the mooring will be deployed at an alternative position. The final deployment position will be recorded and a dhan/pick-up buoy used to mark the location.

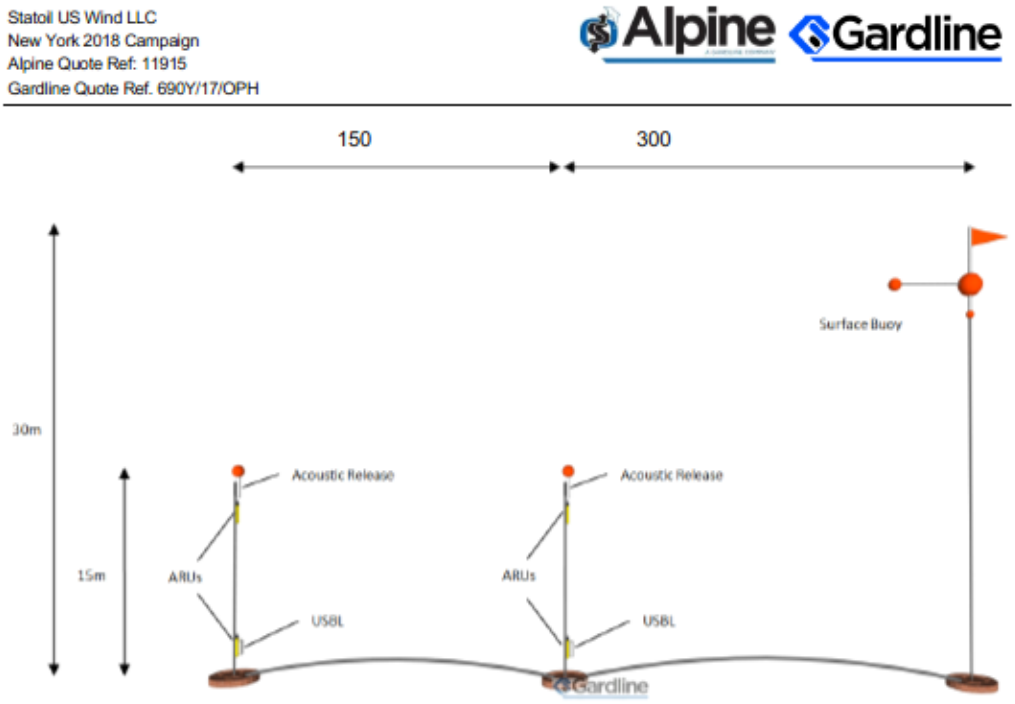

Figure 4. Proposed Sample Mooring Line Deployment with Hydrophone Array

Following the successful deployment of the ARU moorings, the survey vessel will navigate past the ARU mooring at known distances allowing acoustic verification of sound sources to be ascertained and measurements at multiple reference locations to be collected. The following passes will be run along a 2km transect line which spans 1km either side of the ARU moorings:

- Transects (two lines) will be run for the equipment operating below 200kHz independently to enable the apparent peak source levels (at 1 meter) of each piece of equipment to be calculated and determine the distance to the PTS onset of marine mammal, marine turtle, fish and the 166 dB, 160 dB, and 150 dB re 1µPa sound pressure level (SPLrms) isopleths.
- One transect run whilst no equipment is operational to collect data on vessel noise for later assessment should this be required.

During the survey lines "ping/firing intervals" and the ship speed that best correspond with the HRG survey activities will be maintained. Distances and bearings between the vessel and ARU's will be accurately recorded during each pass and sound levels measured at the various ranges for subsequent analysis to confirm the suitability of the exclusion zone for the HRG survey equipment. Similarly, the measured sound levels at the proposed distances will allow for the calculation of the apparent peak source levels (SPLRMS90% and SPLpeak) and distances to the ear injury will be computed for each marine mammal hearing group according BOEM 2016 technical guidance and for marine turtle and fish according to Popper et al 2016. The distance to 160 dB SPLRMS90% re 1µPa marine mammal Level B harassment zone, the behavioural harassment thresholds for sea turtles at 166 dB SPLRMS90% re 1µPa, the 150 dB SPLRMS90% re 1µPa Atlantic Sturgeon behavioural disturbance threshold will also be reported. The proposed survey track is shown below in Figure 3. Data acquisition for the field verification will be conducted in one deployment and every effort will be made that operations are completed within one day (this will be subject to marine mammal shutdowns/power-downs and weather conditions on site). We will attempt to conduct field verification in favourable weather conditions, preventing weather-related artefacts causing interference with the sound propagation monitoring. Deployment and recovery of any in-sea equipment however will be assessed by the

field team, and the working proximity of the survey vessel to the mooring, particularly while operating towed acoustic equipment will be at the discretion of the vessel Master.

In order to reduce inherent risks associated with over-board operations and the close passing of the survey vessel to moored equipment, the field verification and mooring deployment and recovery will occur during the hours of daylight. We anticipate one day will be required for data collection. The vessel will not sail directly above the ARU in order to avoid entanglement. Effort will be made to ensure one of the reference locations is as close as possible to the sound source, whilst avoiding clipping of the data.

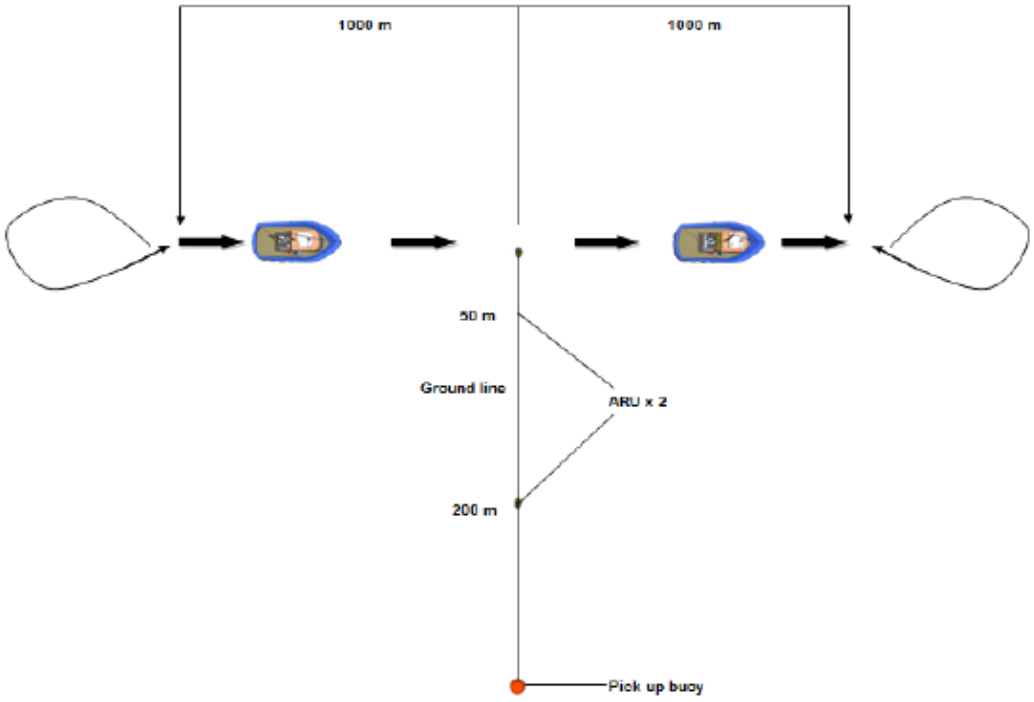

Figure 5. Survey Vessel Track Lines for Field Verification

8.3 Acoustic Verification Equipment

ARUs are stationary and operator independent recording devices, they allow continuous acoustic monitoring within a frequency spectrum and dynamic range regardless of seasonal/weather conditions. Two Wildlife Acoustic Song Meters SM3M with ultrasonic hydrophones (or SM2M as backup units) will be utilized at each mooring location. A spectrum of frequencies will be analyzed in the empirical acoustic data collected during the sound source verification exercise in order to cover vessel noise, biological noise and HRG equipment noise. The ARU hydrophones will record at a sampling rate of 96kHz collecting data between 2Hz to 48kHz. This will enable us to translate the SPL/SEL levels for all the equipment in question firing below 200kHz to carry out the field verification assessment.

SM2M+ Deep Water		SM2M+/SM3M+ Submersible	
Height	148 cm including mounting bracket and hydrophone cage	Height	79.4 cm including eyebolt and hydrophone
Diameter	16.5 cm	Diameter	16.5 cm
Mounting Bracket Slots	3.8 cm high 7.6 cm wide	Eyebolt Anchor	4.3 cm outer diameter 2.5 cm inner diameter 5.1 cm height
Standard Hydrophone	6.4 cm length 1.9 cm diameter	Standard Hydrophone	6.4 cm length 1.9 cm diameter
Weight (air)	24.4 kg with no batteries 32.2 kg fully populated with batteries	Weight (air)	9.5 kg with no batteries 13.5 kg fully populated with batteries
Buoyancy (salt water)	1 kg with no batteries -9.8 kg fully populated with batteries	Buoyancy (salt water)	15.5 kg with no batteries 1.5 kg fully populated with batteries
Rated Depth	800 m	Rated Depth	150 m

Table 16. Specifications of the SM2M+ Deep Water and SM2M+/SM3M+ Submersible ARUs

8.4 Data Processing and Reporting

Data quality is of the upmost importance to ensure the overall accuracy of the monitoring results. Therefore, it is imperative that external factors influencing field measurements should be avoided where possible.

Once acoustic data is retrieved from each ARU unit, initial processing will be conducted on data from the two primary ARUs using Matlab in order to extract the necessary acoustic parameters and information. Signal processing techniques will be used to isolate geophysical equipment acoustic information based on its operating frequency. The underwater noise measurement will be expressed in metrics most commonly used to describe underwater sound including Sound Pressure Level (SPL) and Sound Exposure Level (SEL). SEL containing 90% of central pulse energy will be aggregated over the exposure duration to estimate the cumulative exposure level. Metrics used in the analysis will be clearly stated with reference values to avoid wrong interpretations or comparisons.

Noise analysis includes the use of signal processing to generate a local sound propagation

profile using the measurement within the survey area. This information will be used to inform the propagations of the noise sources expressed in terms of transmission loss (TL), where the rate of attenuation over distance can be determined. This allows the received sound level at any point relative to the ARU position within the survey area to be estimated. In addition, an appropriate spreading model will also be incorporated to estimate the propagation trends of the geophysical equipment as well as to extrapolate for the prediction of the source level. In addition, a detailed spectral analysis will be performed on the field verification data in order to identify the spectral contents of the survey vessel and HRG equipment, specifically at one third octave bands between frequency 20 Hz – 192 kHz, for the assessment of acoustic impact on marine mammal.

Further analysis of the data gathered by the hydrophones deployed 200 m from the survey line will be used for verification purposes or if there are any problems with the data recorded at the close proximity location. Should any discrepancies arise between the data between the two mooring locations these will be reported to BOEM.

Should the Field Verification take place immediately prior to the HRG Survey, data analysis from the primary mooring will be undertaken in the field and the results submitted in a tabulated format (see Appendix B) within 48 hours from data download.

A detailed draft report for the Equipment Field Verification will be submitted to Statoil(the timescales for delivery will be discussed on contract award), which will include:

- A full description of the survey vessel
- Technical description of the equipment being used
- Set-up of the survey equipment
- Thorough description of the methodology for the field verification

The report will detail comprehensive results of the Equipment Field Verification including:

- The apparent peak source levels at 1m for each piece of survey equipment
- Distance to BOEM 2016 PTS onset for 5 marine mammal species group.
- Distance to Popper et al 2016 PTS onset for marine turtle and fish.
- Distance to the 166 dB SPLRMS90% re 1µPa sound pressure level isopleth
- Distance to the 160 dB SPLRMS90% re 1 µPa sound pressure level isopleth
- Distance to the 150 dB SPLRMS90% re 1 µPa sound pressure level isopleth

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APPENDIX C MITIGATION AND MONITORING COMMUNICATIONS FLOW DIAGRAM

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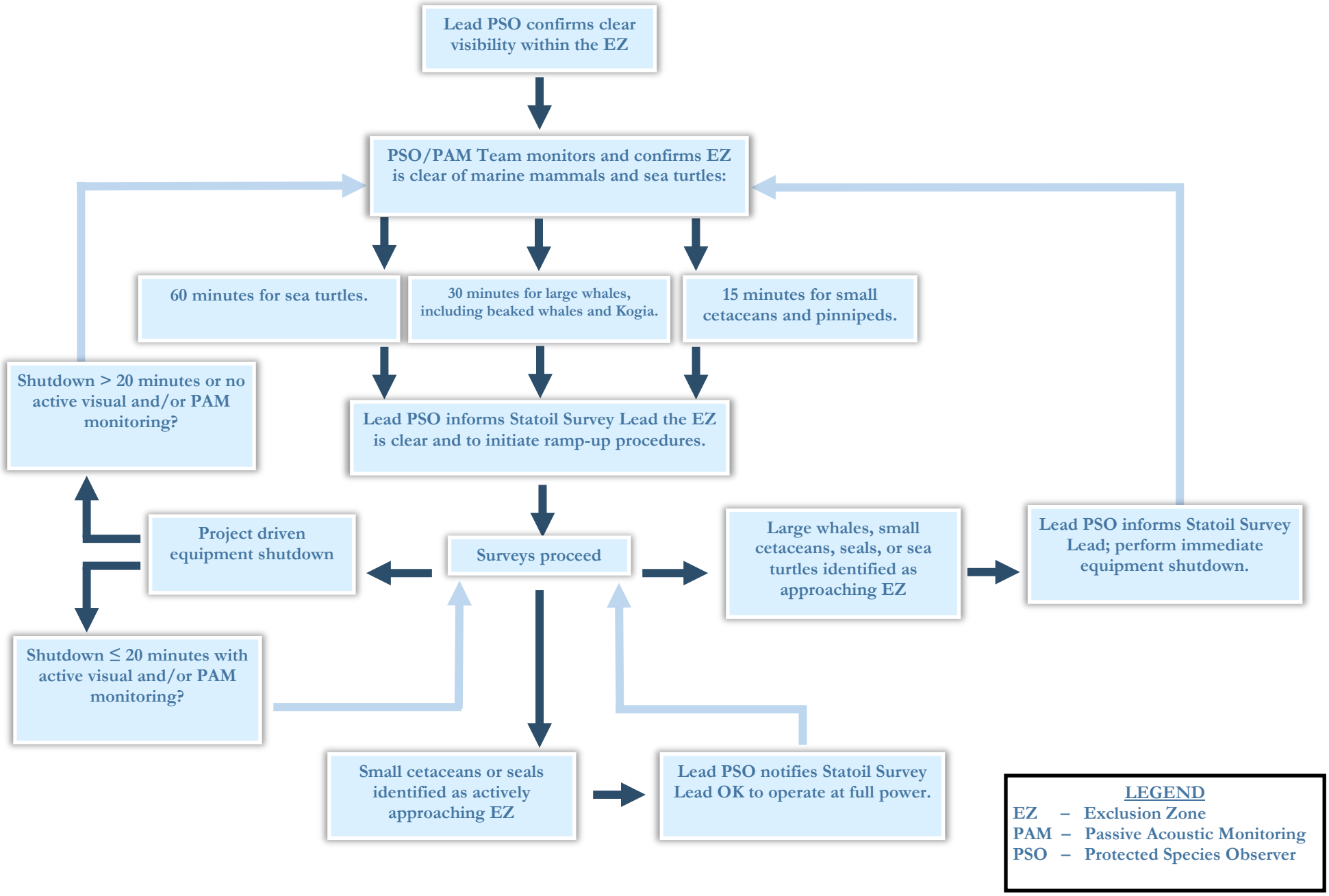
Lead PSO confirms clear visibility within the EZ
PSO/PAM Team monitors and confirms EZ is clear of marine mammals and sea turtles:
60 minutes for sea turtles.
30 minutes for large whales, including beaked whales and Kogia.
15 minutes for small cetaceans and pinnipeds.
Shutdown > 20 minutes or no active visual and/or PAM monitoring?
Lead PSO informs Statoil Survey Lead the EZ is clear and to initiate ramp-up procedures.
Project driven equipment shutdown
Surveys proceed
Large whales, small cetaceans, seals, or sea turtles identified as approaching EZ
Lead PSO informs Statoil Survey Lead; perform immediate equipment shutdown.
Shutdown ≤ 20 minutes with active visual and/or PAM monitoring?
Small cetaceans or seals identified as actively approaching EZ
Lead PSO notifies Statoil Survey Lead OK to operate at full power.
LEGEND
EZ – Exclusion Zone
PAM – Passive Acoustic Monitoring
PSO – Protected Species Observer